

# CONTENTS

---



## General product information

[View](#)

## Added products



### AH3225, T3225, T1215

New grades lineup for a wide range of materials

[View](#)



### DX110

Now available in DX110 PCD grade for long tool life and high precision aluminum machining

[View](#)



MillLine

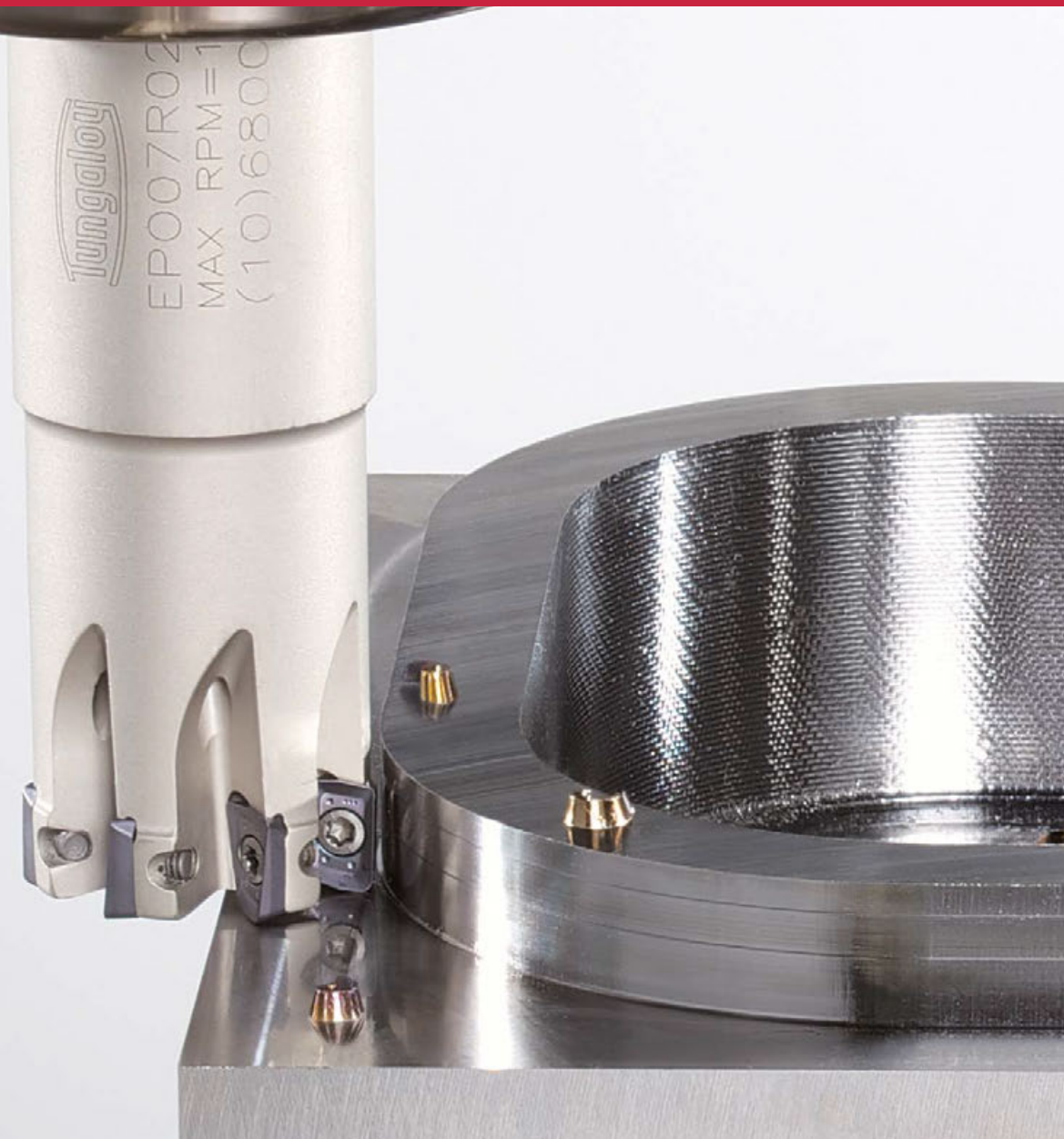
**TUNGREC**

www.tungaloy.com

Tungaloy Report No. 380-G



## Multi-functional high precision cutter



**INDUSTRY 4.0**  
*FEED the SPEED!*



ACCELERATED MACHINING

www.tungaloy.com

**MillLine**



**TUNGREC**  
TUNGALOY

Highly productive semi-finish  
milling cutter with  
accurate 90° shoulders

Member IMC Group  
**Tungaloy**

# TUNGREC

TUNGALOY

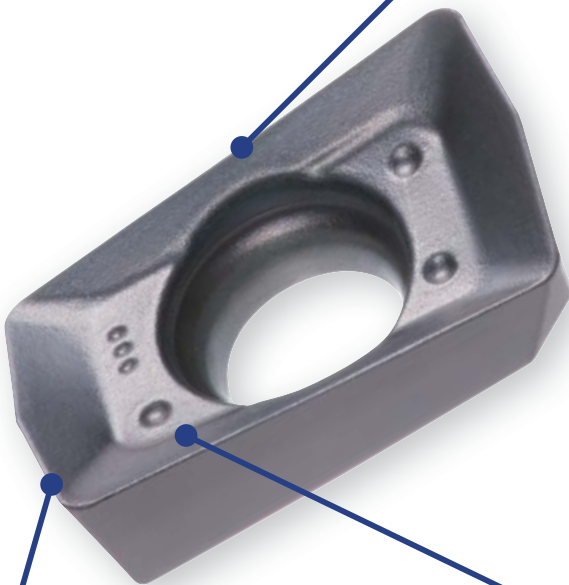
**Highly productive semi-finish milling cutter with accurate 90° shoulders**  
 Helical cutting edges and high axial rake angles provide free cutting.



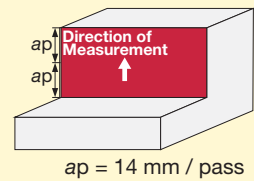
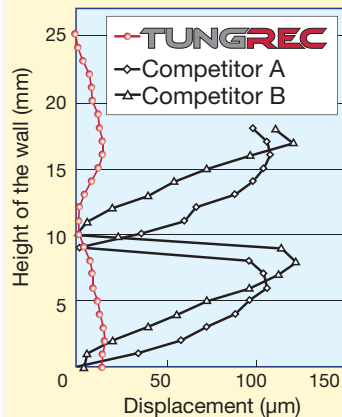
## ● High performance inserts

### Helical cutting edges

**Excellent wall straightness!**



#### ■ Comparison of straightness

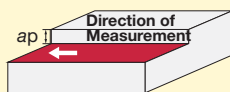
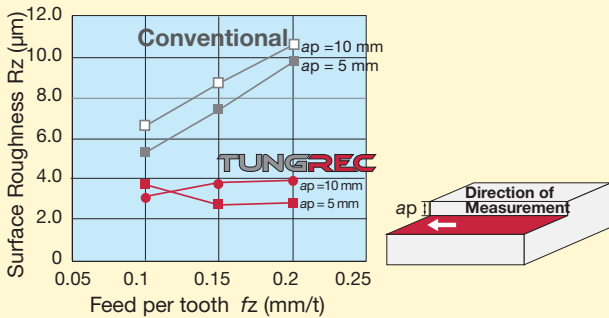


Milling cutter : EPO18R025M25.0-02 (ø25, z = 2)  
 Workpiece : S55C / C55  
 Cutting speed : Vc = 150 m/min  
 Feed per tooth : fz = 0.1 mm/t  
 Depth of cut : ap = 14 mm x 2 passes  
 Width of cut : ae = 5 mm

### Wiper edges

**Excellent surface finish!**

#### ■ Comparison of surface roughness

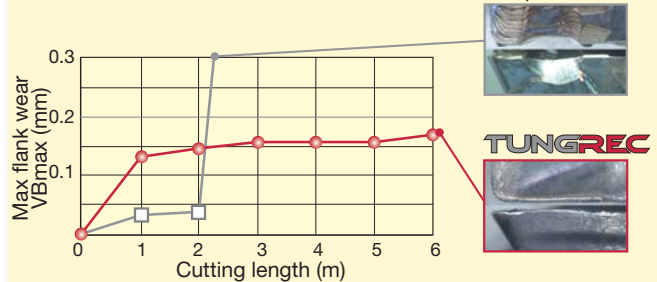


Milling cutter : EPO18R025M25.0-02 (ø25, z = 2)  
 Workpiece : S55C / C55  
 Cutting speed : Vc = 150 m/min  
 Depth of cut : ap = 5 mm / 10 mm  
 Width of cut : ae = 20 mm

### Optimized rake angle

**Provides sharpness and reliability!**

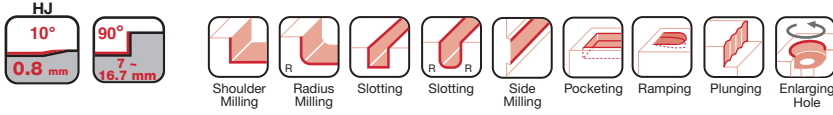
#### ■ Comparison of tool life



Milling cutter : EPO18R025M25.0-02 (ø25, z = 2, only one insert used)  
 Grade : AH140  
 Workpiece : SUS304 / X5CrNi18-9  
 Cutting speed : Vc = 150 m/min  
 Feed per tooth : fz = 0.15 mm/t  
 Depth of cut : ap = 5 mm  
 Width of cut : ae = 10 mm

## ● High precision shoulder milling cutter

4 types of chipbreakers for a wide range of applications



### ● Chipbreakers

**MJ type**  
for general machining

**P M K S**  
Steel Stainless Cast Iron Superalloys

ASMT11 AOMT07

**MS type**  
for stainless steel machining

**M S**  
Stainless Superalloys

ASMT11

**AJ type**  
for aluminium machining

**N**  
Non-ferrous

AOGT18 AOGT07

**HJ type**  
for high feed machining

**P M K S**  
Steel Stainless Cast Iron Superalloys

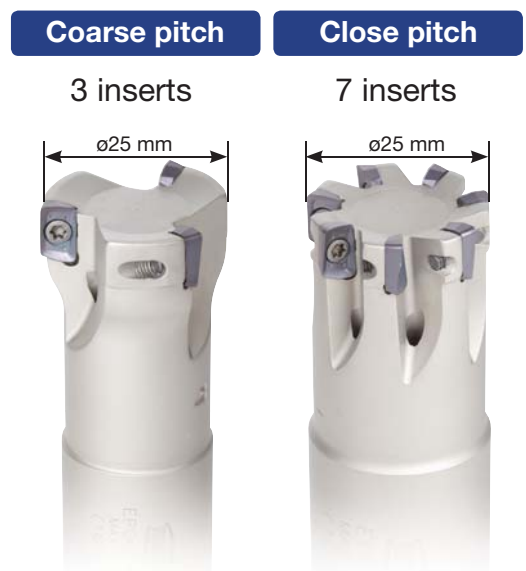
AOMT07

## ● High performance cutter bodies

**Air holes** ➔ For improved chip evacuation!

**Coarse pitch, close pitch and long shank cutters available!**

➔ Choice of optimum cutter body for your application!



■ Max. depth of cut:  $a_p$  / with MJ chipbreaker

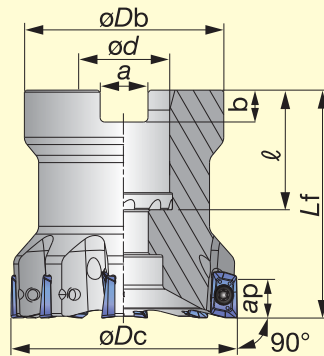
**AOMT18**  
Max.  $a_p$  = 16.7 mm

**ASMT11**  
Max.  $a_p$  = 10.6 mm

**AOMT07**  
Max.  $a_p$  = 7.0 mm

## Cutter

### Bore type



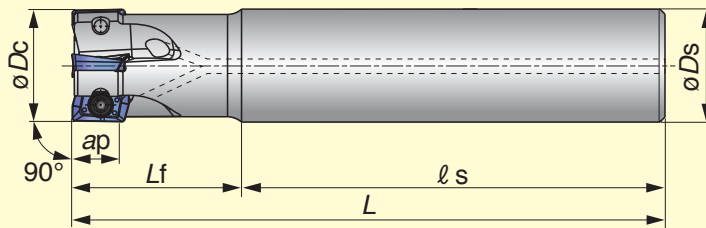
Max. ap:  
MJ = 7 mm  
AJ = 6.4 mm  
HJ = 0.8 mm

#### Parts

Description	Cat. No.
Wrench	T-7DB

Cat. No.	Stock	No. of inserts	Dimensions (mm)						Weight (kg)	Air hole	Center bolt	Clamping screw	Inserts	
			* $\phi Dc$	$\phi Db$	$\phi d$	$\ell$	** $L_f$	$b$						$a$
TPO07R032M16.0E08	●	8	32	30	16	21	40	5.6	8.4	0.1	with	CM8x30H	CSTB-2.5L046	AO□T0702...
TPO07R040M16.0E10	●	10	40	35	16	21	40	5.6	8.4	0.2	with	CM8x30H	CSTB-2.5L046	AO□T0702...
TPO07R050M22.0E12	●	12	50	41	22	22	40	6.3	10.4	0.3	with	CM10x30H	CSTB-2.5L046	AO□T0702...

### Shank type



Max. ap:  
MJ = 7 mm  
AJ = 6.4 mm  
HJ = 0.8 mm

#### Parts

Description	Cat. No.
Wrench	T-7DB

Cat. No.	Stock	No. of inserts	Dimensions (mm)					Weight (kg)	Air hole	Clamping Screw	Inserts
			* $\phi Dc$	$\phi Ds$	$\ell_s$	** $L_f$	** $L$				
EPO07R012M12.0-02	●	2	12	12	50	18	68	0.1	with	CSTB-2.5L046	AO□T0702...
EPO07R012M12.0-02L	●	2	12	12	95	30	125	0.1	with	CSTB-2.5L046	AO□T0702...
EPO07R016M12.0-02	●	2	16	12	50	20	70	0.1	with	CSTB-2.5L046	AO□T0702...
EPO07R016M16.0-02L	●	2	16	16	105	40	145	0.2	with	CSTB-2.5L046	AO□T0702...
EPO07R016M16.0-04	●	4	16	16	60	24	84	0.1	with	CSTB-2.5L046	AO□T0702...
EPO07R018M16.0-02L	●	2	18	16	105	40	145	0.2	with	CSTB-2.5L046	AO□T0702...
EPO07R018M16.0-04	●	4	18	16	60	24	84	0.1	with	CSTB-2.5L046	AO□T0702...
EPO07R020M16.0-03	●	3	20	16	60	30	90	0.1	with	CSTB-2.5L046	AO□T0702...
EPO07R020M20.0-03L	●	3	20	20	135	50	185	0.4	with	CSTB-2.5L046	AO□T0702...
EPO07R020M20.0-05	●	5	20	20	70	30	100	0.2	with	CSTB-2.5L046	AO□T0702...
EPO07R022M20.0-03L	●	3	22	20	135	50	185	0.4	with	CSTB-2.5L046	AO□T0702...
EPO07R022M20.0-05	●	5	22	20	70	30	100	0.2	with	CSTB-2.5L046	AO□T0702...
EPO07R025M20.0-03	●	3	25	20	60	35	95	0.3	with	CSTB-2.5L046	AO□T0702...
EPO07R025M25.0-03L	●	3	25	25	150	70	220	0.7	with	CSTB-2.5L046	AO□T0702...
EPO07R025M25.0-07	●	7	25	25	80	35	115	0.4	with	CSTB-2.5L046	AO□T0702...
EPO07R028M25.0-03L	●	3	28	25	150	70	220	0.7	with	CSTB-2.5L046	AO□T0702...
EPO07R028M25.0-07	●	7	28	25	80	35	115	0.4	with	CSTB-2.5L046	AO□T0702...

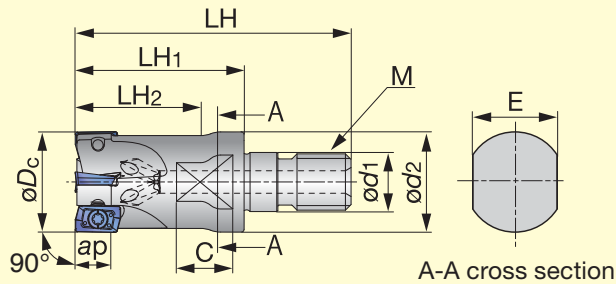
\*The  $\phi Dc$  in the above table shows the diameter when MJ and AJ chipbreakers are used. When HJ chipbreaker is used, the tool diameter is equal to the above shown  $\phi Dc + 0.6$  mm.

\*\*The  $L_f$  and  $L$  in the above table show the lengths when MJ chip-breaker is used. When AJ chipbreaker is used, the lengths are equal to  $L_f$ ,  $L + 0.1$  mm. When HJ chipbreaker is used, the lengths are equal to  $L_f$ ,  $L + 0.5$  mm.

● : Stocked items



## Modular type



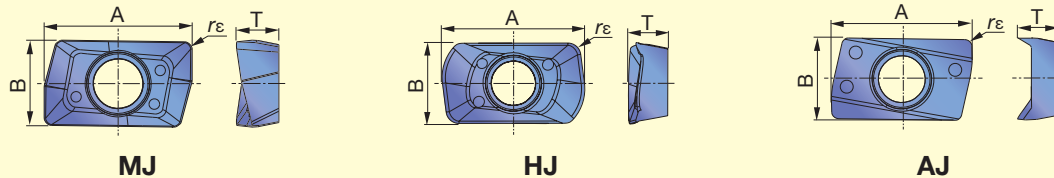
Max. ap:  
 MJ = 7.0 mm  
 AJ = 6.4 mm  
 HJ = 0.8 mm

### Parts

Descriptions	Parts Cat. No.
Clamping screw	<b>CSTB-2.5L046</b>
Wrench	<b>T-7DB</b>

Cat. No.	Stock	No. of Inserts	Dimensions (mm)									Weight (kg)	Air hole	Applicable Insert
			øDc	LH	LH1	LH2	C	E	ød1	ød2	M			
<b>New</b> HPO07R012MM06-02	★	2	12	39.5	25	-	5	7	6.5	9.8	M6	0.01	with	AO□T0702...
HPO07R012MM08-02	●	2	12	42	25	20	8	10	8.5	12.8	M8	0.02	with	AO□T0702...
<b>New</b> HPO07R016MM08-04	★	4	16	42	25	-	8	10	8.5	12.8	M8	0.03	with	AO□T0702...
HPO07R016MM10-04	●	4	16	49	30	20	6.5	15	10.5	17.8	M10	0.05	with	AO□T0702...
HPO07R020MM10-05	●	5	20	49	30	-	10	15	10.5	17.8	M10	0.06	with	AO□T0702...
HPO07R025MM12-07	●	7	25	57	35	-	10	17	12.5	20.8	M12	0.10	with	AO□T0702...

## Inserts



Cat. No.	Accuracy	Honing	Grades			Dimensions (mm)			
			Coated		Carbide	A	B	T	rε
			AH725	AH140					
AOMT070202PDPR-MJ	M	with	●	●		8.0	4.7	2.3	0.2
AOMT070204PDPR-MJ	M	with	●	●		8.0	4.7	2.3	0.4
AOMT070208PDPR-MJ	M	with	●	●		8.0	4.7	2.3	0.8
AOMT070216PDPR-MJ	M	with	●	●		8.0	4.7	2.3	1.6
AOMT070208PDPR-HJ	M	with	●	●		8.8	4.9	2.4	0.8
AOGT070204PDR-AJ	G	without			●	8.1	4.7	2.3	0.4

● : Stocked items  
 ★ : Available in 2015

## Standard cutting conditions

ISO	Workpiece materials	Hardness HB	Grades	Cutting Speed Vc (m/min)	Feed per tooth: fz (mm/t)		
					MJ	HJ	AJ
<b>P</b>	Low carbon steel (S15C / C15E4 etc.)	< 200	<b>AH725</b>	90 - 200	0.05 - 0.1	0.4 - 0.9	-
	High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.)	200 - 300	<b>AH725</b>	90 - 150	0.05 - 0.1	0.4 - 0.9	-
	Tool steel (SKD11 / X153CrMoV12 etc.)	150 - 300	<b>AH725</b>	80 - 120	0.05 - 0.1	0.4 - 0.9	-
<b>M</b>	Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	<b>AH140</b>	90 - 150	0.05 - 0.1	0.4 - 0.9	-
<b>K</b>	Grey cast irons (FC250 / 250 etc.)	150 - 250	<b>AH725</b>	100 - 180	0.05 - 0.1	0.4 - 0.9	-
	Ductile cast irons (FCD450 / 450-10S etc.)	150 - 250	<b>AH725</b>	80 - 150	0.05 - 0.1	0.4 - 0.9	-
<b>N</b>	Aluminium alloys (Si < 13%)	-	<b>KS15F</b>	300 - 1000	-	-	0.08 - 0.2
	Aluminium alloys (Si ≥ 13%)	-	<b>KS15F</b>	100 - 200	-	-	0.08 - 0.2
<b>S</b>	Titanium alloys (Ti-6Al-4V etc.)	-	<b>AH725</b>	20 - 50	0.05 - 0.1	0.4 - 0.9	-
	Superalloys (Inconel 718 etc.)	-	<b>AH725</b>	20 - 35	0.05 - 0.08	0.2 - 0.6	-

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

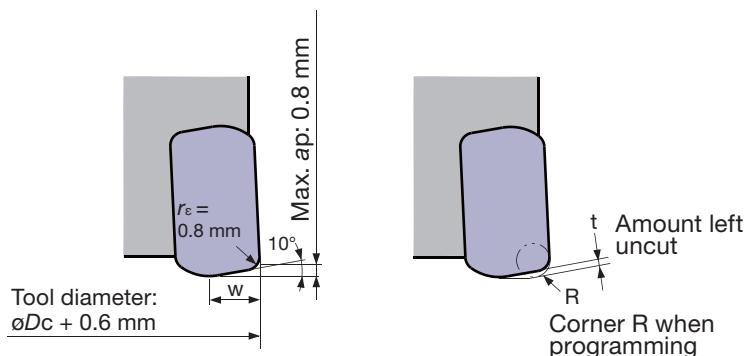
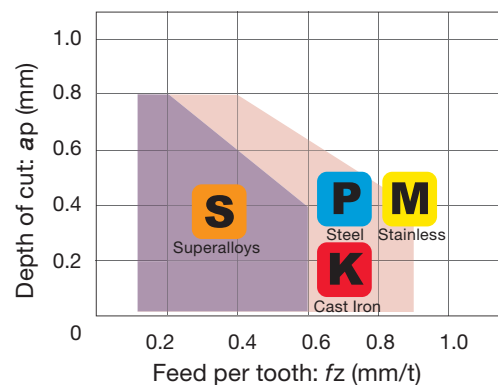
## Cautionary points when using HJ inserts

HJ type inserts are designed for high feed machining.

Please note the following when using HJ inserts:

1. The shape of HJ insert differs from that of other inserts (MJ, AJ). However the same insert pocket can be used.
2. When using HJ inserts, all the inserts on the cutter body must be HJ type. Do not use other types of inserts (MJ and AJ types) with HJ inserts on the same cutter body.
3. When using CAD/CAM, please program it as a radius cutter. The table below shows the corner R when programming and the uncut area (t).
4. With HJ inserts, the tool diameter increases by 0.6 mm over the diameter  $\phi D_c$  shown in the table.

## TungRec 07 type HJ inserts Standard conditions

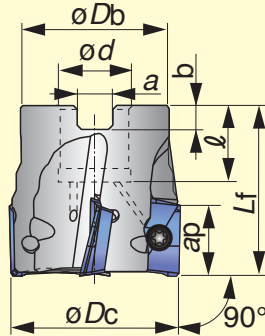


Max. depth of cut max ap (mm)	Main cutting edge length W (mm)	Corner R when programming	Amount left uncut t (mm)
0.8	3.0	R 0.5	0.4
		R 1.0	0.3

## Cutter

### Bore type

**NEW**



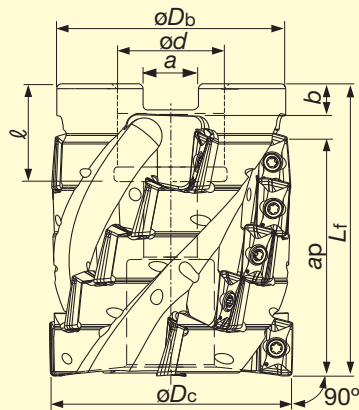
Max.  $ap = 10.6$  mm

#### Parts

Description	Cat. No.
Wrench	IP-8D

Cat. No.	Stock	No. of inserts	Dimensions (mm)							Weight (kg)	Air hole	Center bolt	Clamping screw	Inserts
			$\phi D_c$	$\phi D_b$	$\phi d$	$\ell$	$L_f$	$b$	$a$					
TPO11R040M16.0E06	★	6	40	35	16	18	40	5.6	8.4	0.21	with	CM8x30H	CSPB-2.5	AS□T11T3...
TPO11R050M22.0E07	★	7	50	45	22	20	40	6.3	10.4	0.35	with	CM10x30H	CSPB-2.5	AS□T11T3...
TPO11R063M22.0E08	★	8	63	47	22	20	45	6.3	10.4	0.59	with	CM10x30H	CSPB-2.5	AS□T11T3...
TPO11R080M25.4-10	★	10	80	58	25.4	26	50	6	9.5	1.07	with	CM12X30H	CSPB-2.5	AS□T11T3...
TPO11R080M27.0E10	★	10	80	58	27	22	50	7	12.4	1.05	with	CM12X30H	CSPB-2.5	AS□T11T3...
TPO11R100M31.75-11	★	11	100	70	31.75	32	63	8	12.7	1.95	with	CM16X40H	CSPB-2.5	AS□T11T3...
TPO11R100M32.0E11	★	11	100	70	32	25	63	8	14.4	2.01	with	CM16X40H	CSPB-2.5	AS□T11T3...
TPS11040RB	▲	6	40	35	16	18	40	5.6	8.2	0.2	with	CM8X30H	CSPB-2.5	AS□T11T3...
TPS11040RB-E	▲	6	40	35	16	19	40	5.6	8.4	0.2	without	CM8X30	CSPB-2.5	AS□T11T3...
TPS11050RB	▲	7	50	41	22	20	40	6	10	0.4	with	CM10X30H	CSPB-2.5	AS□T11T3...
TPS11050RB-E	▲	7	50	41	22	20	40	6.3	10.4	0.4	without	CM10X30	CSPB-2.5	AS□T11T3...
TPS11063RB	▲	8	63	41	22	20	40	6	10	0.6	with	CM10X30H	CSPB-2.5	AS□T11T3...
TPS11063RB-E	▲	8	63	41	22	20	45	6.3	10.4	0.6	without	CM10X30	CSPB-2.5	AS□T11T3...
TPS11080RB	▲	10	80	58	25.4	26	50	6	9.5	1.2	with	CM12X30H	CSPB-2.5	AS□T11T3...
TPS11100RB	▲	11	100	70	31.75	32	63	8	12.7	2.4	with	CM16X40H	CSPB-2.5	AS□T11T3...

### Roughing bore type



#### Parts

Description	Cat. No.	
Cutter	TLS11R...	ELS11R...
Clamping screw	CSPB-2.5	
Wrench	IP-8D	
Center bolt	CM10X40H	-

Cat. No.	Stock	No. of eff. edge lines	Dimensions (mm)							Weight (kg)	Air hole	No. of inserts	Inserts	
			$\phi D_c$	$\phi D_b$	$\phi d$	$\ell$	$L_f$	$b$	$a$					Max. $ap$
TLS11R050M22.0E04	●	4	50	47	22	20	60	6.3	10.4	48.8	0.5	with	20	AS□T11T3...

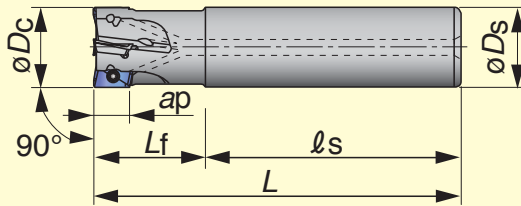
Note: Coolant cannot be supplied through the arbor center (through the clamping screw). Supply coolant through the flange of the arbor pilot.

- : Stocked items
- ★ : Available in 2014
- ▲ : Discontinued items

## Cutter

### Shank type

**NEW**



Max.  $ap = 10.6 \text{ mm}$

#### Parts

Description	Cat. No.
Wrench	IP-8D

Cat. No.	Stock	No. of inserts	Dimensions (mm)					Weight (kg)	Air hole	Clamping screw	Inserts
			$\varnothing D_c$	$\varnothing D_s$	$l_s$	$L_f$	$L$				
EPO11R012M16.0-01	●	1	12	16	60	25	85	0.11	with	CSPB-2.5S	AS□T11T3...
EPO11R012M16.0-01L	●	1	12	16	95	30	125	0.16	with	CSPB-2.5S	AS□T11T3...
EPO11R016M16.0-02	●	2	16	16	60	25	85	0.12	with	CSPB-2.5S	AS□T11T3...
EPO11R016M16.0-02L	●	2	16	16	105	40	145	0.2	with	CSPB-2.5S	AS□T11T3...
EPO11R018M16.0-02	★	2	18	16	60	25	85	0.12	with	CSPB-2.5S	AS□T11T3...
EPO11R018M16.0-02L	★	2	18	16	105	40	145	0.21	with	CSPB-2.5S	AS□T11T3...
EPO11R020M20.0-02	●	2	20	20	70	30	100	0.22	with	CSPB-2.5S	AS□T11T3...
EPO11R020M20.0-02L	●	2	20	20	135	50	185	0.41	with	CSPB-2.5S	AS□T11T3...
EPO11R020M20.0-03	●	3	20	20	70	30	100	0.21	with	CSPB-2.5S	AS□T11T3...
EPO11R022M20.0-02	★	2	22	20	70	30	100	0.22	with	CSPB-2.5S	AS□T11T3...
EPO11R022M20.0-02L	★	2	22	20	155	30	185	0.42	with	CSPB-2.5S	AS□T11T3...
EPO11R022M20.0-03	★	3	22	20	70	30	100	0.22	with	CSPB-2.5S	AS□T11T3...
EPO11R025M25.0-02L	●	2	25	25	150	70	220	0.76	with	CSPB-2.5	AS□T11T3...
EPO11R025M25.0-03	●	3	25	25	80	35	115	0.39	with	CSPB-2.5	AS□T11T3...
EPO11R025M25.0-04	●	4	25	25	80	35	115	0.38	with	CSPB-2.5	AS□T11T3...
EPO11R028M25.0-02L	★	2	28	25	185	35	220	0.8	with	CSPB-2.5	AS□T11T3...
EPO11R028M25.0-03	★	3	28	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPO11R028M25.0-04	★	4	28	25	80	35	115	0.39	with	CSPB-2.5	AS□T11T3...
EPO11R030M25.0-02L	★	2	30	25	180	40	220	0.8	with	CSPB-2.5	AS□T11T3...
EPO11R030M25.0-03	★	3	30	25	80	40	120	0.43	with	CSPB-2.5	AS□T11T3...
EPO11R030M25.0-04	★	4	30	25	80	40	120	0.42	with	CSPB-2.5	AS□T11T3...
EPO11R032M32.0-02L	●	2	32	32	175	80	255	1.48	with	CSPB-2.5	AS□T11T3...
EPO11R032M32.0-03	●	3	32	32	80	40	120	0.68	with	CSPB-2.5	AS□T11T3...
EPO11R032M32.0-05	●	5	32	32	80	40	120	0.67	with	CSPB-2.5	AS□T11T3...
EPO11R035M32.0-02L	★	2	35	32	215	40	255	1.49	with	CSPB-2.5	AS□T11T3...
EPO11R035M32.0-03	★	3	35	32	80	40	120	0.69	with	CSPB-2.5	AS□T11T3...
EPO11R035M32.0-05	★	5	35	32	80	40	120	0.67	with	CSPB-2.5	AS□T11T3...
EPO11R040M32.0-02L	★	2	40	32	205	50	255	1.53	with	CSPB-2.5	AS□T11T3...
EPO11R040M32.0-04	●	4	40	32	80	40	120	0.72	with	CSPB-2.5	AS□T11T3...
EPO11R040M32.0-06	●	6	40	32	80	40	120	0.71	with	CSPB-2.5	AS□T11T3...
EPO11R050M32.0-05	●	5	50	32	80	40	120	0.83	with	CSPB-2.5	AS□T11T3...
EPO11R050M32.0-07	●	7	50	32	80	40	120	0.82	with	CSPB-2.5	AS□T11T3...
EPO11R050M42.0-03L	★	3	50	42	310	50	360	3.78	with	CSPB-2.5	AS□T11T3...

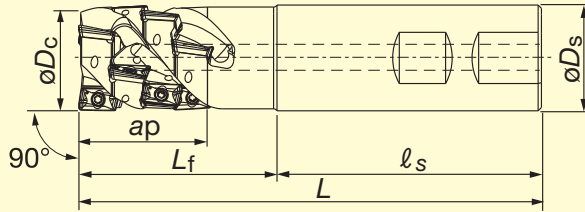
● : Stocked items  
★ : Available in 2014

Cat. No.	Stock	No. of inserts	Dimensions (mm)				Weight (kg)	Air hole	Clamping screw	Inserts	
			$\varnothing D_c$	$\varnothing D_s$	$l_s$	$L_f$					$L$
EPS11012RL	▲	1	12	16	95	30	125	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11012RS	▲	1	12	16	60	25	85	0.1	with	CSPB-2.5S	AS□T11T3...
EPS11012RS-E	▲	1	12	16	55	25	80	0.1	with	CSPB-2.5S	AS□T11T3...
EPS11016RL	▲	2	16	16	105	40	145	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11016RS	▲	2	16	16	60	25	85	0.1	with	CSPB-2.5S	AS□T11T3...
EPS11016RS-E	▲	2	16	16	60	25	85	0.1	with	CSPB-2.5S	AS□T11T3...
EPS11018RL	▲	2	18	16	105	40	145	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11018RS	▲	2	18	16	60	25	85	0.1	with	CSPB-2.5S	AS□T11T3...
EPS11020RL	▲	2	20	20	135	50	185	0.4	with	CSPB-2.5S	AS□T11T3...
EPS11020RS	▲	2	20	20	70	30	100	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11020RSB	▲	3	20	20	70	30	100	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11020RSB-E	▲	3	20	20	60	30	90	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11021RL	▲	2	21	20	135	50	185	0.4	with	CSPB-2.5S	AS□T11T3...
EPS11021RS	▲	2	21	20	70	30	100	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11021RSB	▲	3	21	20	70	30	100	0.2	with	CSPB-2.5S	AS□T11T3...
EPS11025RL	▲	2	25	25	150	70	220	0.8	with	CSPB-2.5	AS□T11T3...
EPS11025RS	▲	3	25	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPS11025RSB	▲	4	25	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPS11025RSB-E	▲	4	25	25	60	35	95	0.4	with	CSPB-2.5	AS□T11T3...
EPS11025RSS20	▲	2	25	20	60	35	95	0.2	with	CSPB-2.5	AS□T11T3...
EPS11026RL	▲	2	26	25	150	70	220	0.8	with	CSPB-2.5	AS□T11T3...
EPS11026RS	▲	3	26	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPS11026RSB	▲	4	26	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPS11030RL	▲	2	30	25	150	70	220	0.9	with	CSPB-2.5	AS□T11T3...
EPS11030RS	▲	3	30	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPS11030RSB	▲	4	30	25	80	35	115	0.4	with	CSPB-2.5	AS□T11T3...
EPS11030RSS20	▲	2	30	20	60	35	95	0.3	with	CSPB-2.5	AS□T11T3...
EPS11032RL	▲	2	32	32	175	80	255	1.5	with	CSPB-2.5	AS□T11T3...
EPS11032RS	▲	3	32	32	80	40	120	0.7	with	CSPB-2.5	AS□T11T3...
EPS11032RSB	▲	5	32	32	80	40	120	0.7	with	CSPB-2.5	AS□T11T3...
EPS11032RSB-E	▲	5	32	32	70	40	110	0.7	with	CSPB-2.5	AS□T11T3...
EPS11032RSS20	▲	2	32	20	60	35	95	0.3	with	CSPB-2.5	AS□T11T3...
EPS11033RL	▲	2	33	32	175	80	255	1.5	with	CSPB-2.5	AS□T11T3...
EPS11033RS	▲	3	33	32	80	40	120	0.7	with	CSPB-2.5	AS□T11T3...
EPS11033RSB	▲	5	33	32	80	40	120	0.7	with	CSPB-2.5	AS□T11T3...
EPS11040RL	▲	2	40	32	205	50	255	1.6	with	CSPB-2.5	AS□T11T3...
EPS11040RS	▲	4	40	32	80	40	120	0.8	with	CSPB-2.5	AS□T11T3...
EPS11040RSB	▲	6	40	32	80	40	120	0.8	with	CSPB-2.5	AS□T11T3...
EPS11040RLS42	▲	2	40	42	210	100	310	3.0	with	CSPB-2.5	AS□T11T3...
EPS11040RSS20	▲	3	40	20	60	35	95	0.4	with	CSPB-2.5	AS□T11T3...
EPS11050RL	▲	3	50	42	310	50	360	3.9	with	CSPB-2.5	AS□T11T3...
EPS11050RS	▲	5	50	32	80	40	120	1.0	with	CSPB-2.5	AS□T11T3...
EPS11050RSB	▲	7	50	32	80	40	120	1.0	with	CSPB-2.5	AS□T11T3...
EPS11050RSS20	▲	3	50	20	60	35	95	0.5	with	CSPB-2.5	AS□T11T3...

▲ : Discontinued items

## Cutter

### Roughing shank type

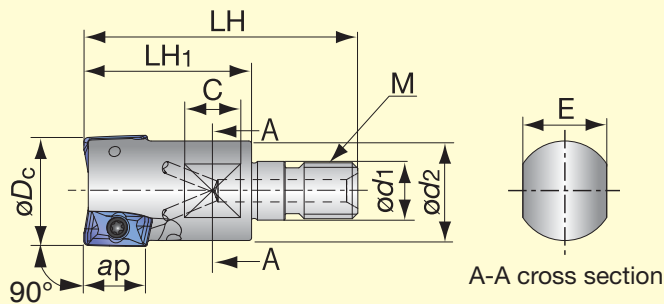


#### Parts

Description	Cat. No.	
Cutter	TLS11R...	ELS11R...
Clamping screw	CSPB-2.5	
Wrench	IP-8D	
Center bolt	CM10X40H	-

Cat. No.	Stock	No. of eff. edge lines	Dimensions (mm)						Weight (kg)	Air hole	No. of inserts	Inserts
			$\phi D_c$	$\phi D_s$	$l_s$	$L_f$	$L$	Max. $ap$				
ELS11R025M25.0W02	●	2	25	25	80	40	120	30.4	0.4	with	6	AS□T11T3...
ELS11R032M32.0W03	●	3	32	32	80	60	140	39.4	0.8	with	12	AS□T11T3...
ELS11R040M42.0W03	●	3	40	42	90	60	150	40	1.4	with	12	AS□T11T3...

### Modular type



Max.  $ap = 10.6$  mm

#### Parts

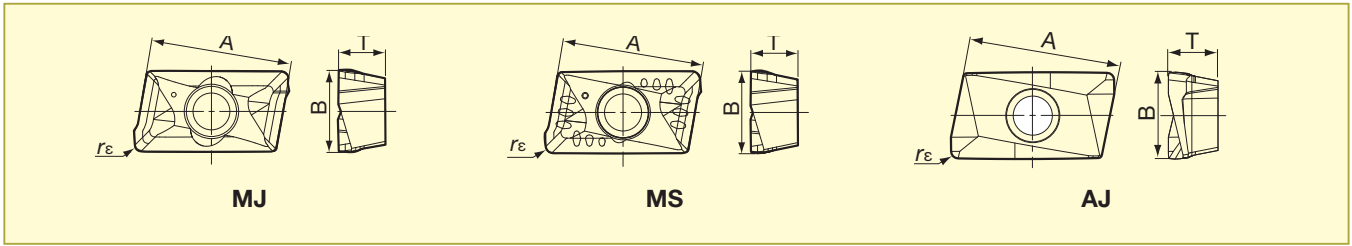
Descriptions	Parts Cat. No.	
Clamping screw	HPO11R020	HPO11R025, HPO11R032
	CSPB-2.5S	CSPB-2.5
Wrench	IP-8D	

Cat. No.	Stock	No. of Inserts	Dimensions (mm)								Weight (kg)	Air hole	Applicable Insert
			$\phi D_c$	LH	LH <sub>1</sub>	C	E	$\phi d_1$	$\phi d_2$	M			
HPO11R020MM10-02	●	2	20	49	30	10	15	10.5	17.8	M10	0.06	with	AS□T11T3...
HPO11R025MM12-03	●	3	25	57	35	10	17	12.5	20.8	M12	0.10	with	AS□T11T3...
HPO11R032MM16-03	●	3	32	63	40	12	22	17.0	28.8	M16	0.20	with	AS□T11T3...

● : Stocked items



## ● Inserts



Cat. No.	Accuracy Honing	Grades									Dimensions (mm)				
		Coated						DLC coated	Cermet	Uncoated	A	B	T	$r_{\epsilon}$	
		AH725	AH120	AH130	AH140	T3130	T1115	DS1100	NS740	KS05F					
ASMT11T304PDPR-MJ	M with	●	●			●	●			●		11.6	6.7	3.7	0.4
ASMT11T308PDPR-MJ	M with	●	●			●	●			●		11.6	6.7	3.7	0.8
ASMT11T312PDPR-MJ	M with	●	●			●						11.6	6.7	3.7	1.2
ASMT11T316PDPR-MJ	M with	●	●			●				●		11.6	6.7	3.7	1.6
ASMT11T320PDPR-MJ	M with		●									11.6	6.7	3.7	2.0
ASMT11T330PDPR-MJ	M with		●									11.6	6.7	3.7	3.0
ASMT11T304PDPR-MS	M with			●	●							11.6	6.7	3.7	0.4
ASGT11T304PDFR-AJ	G without							●			●	11.6	6.7	3.7	0.4
ASGT11T308PDFR-AJ	G without							●			●	11.6	6.7	3.7	0.8

● : Stocked items



## ● Standard cutting conditions

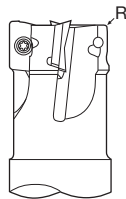
### TPS11 / EPS11, HPO11, TPO11 / EPO11 type

ISO	Workpiece materials	Brinell hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)		
						MJ	MS	AJ
<b>P</b>	Low carbon steel (S15C / C15E4 etc.)	~ 200	First choice	<b>AH725</b>	100 - 250	0.1 - 0.2	-	-
		~ 200	For wear resistance	<b>T3130</b>	100 - 250	0.1 - 0.2	-	-
		~ 200	For surface appearance	<b>NS740</b>	100 - 250	0.05 - 0.15	-	-
	High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.)	200 ~ 300	First choice	<b>AH725</b>	100 - 200	0.1 - 0.15	-	-
		200 ~ 300	For wear resistance	<b>T3130</b>	100 - 200	0.1 - 0.15	-	-
		200 ~ 300	For surface appearance	<b>NS740</b>	100 - 200	0.05 - 0.12	-	-
Tool steel (SKD11 / X153CrMoV12 etc.)	150 ~ 300	First choice	<b>AH725</b>	100 - 150	0.1 - 0.15	-	-	
	150 ~ 300	For wear resistance	<b>T3130</b>	100 - 150	0.1 - 0.15	-	-	
<b>M</b>	Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	-	<b>AH130</b>	80 - 200	-	0.08 - 0.2	-
<b>K</b>	Grey cast irons (FC250 / 250 etc.)	150 ~ 250	First choice	<b>AH120</b>	100 - 250	0.12 - 0.2	-	-
		150 ~ 250	For wear resistance	<b>T1115</b>	100 - 250	0.12 - 0.2	-	-
	Ductile cast irons (FCD450 / 450-10S etc.)	150 ~ 250	First choice	<b>AH120</b>	80 - 200	0.12 - 0.2	-	-
		150 ~ 250	For wear resistance	<b>T1115</b>	80 - 200	0.12 - 0.2	-	-
<b>N</b>	Aluminium alloys (Si < 13%)	-	-	<b>DS1100</b>	300 - 1000	-	-	0.05 - 0.2
	Aluminium alloys (Si ≥ 13%)	-	-	<b>DS1100</b>	100 - 200	-	-	0.05 - 0.2
	Copper alloys	-	-	<b>KS05F</b>	200 - 500	-	-	0.05 - 0.2
<b>S</b>	Titanium alloys (Ti-6Al-4V etc.)	-	-	<b>AH130</b>	20 - 60	-	0.08 - 0.15	-
	Superalloys (Inconel 718 etc.)	-	-	<b>AH725</b>	20 - 40	0.08 - 0.13	-	-

### ■ Cautionary point in modifying cutter bodies

When using inserts with corner radius  $r_{\epsilon} \geq 2.0$  mm, standard cutter bodies have to be modified "R". (Only for TPS11, EPS11, TLS11, ELS11, HPO11, EPO11)

- From 2nd row onwards, please use insert with  $r_{\epsilon} = 0.4$  or  $0.8$  mm



Corner radius $r_{\epsilon}$ (mm)	The dimension of modifying (mm)
0.4 ~ 1.6	Unnecessary
2.0 ~ 3.2	2



## Roughing type TLS11 / ELS11

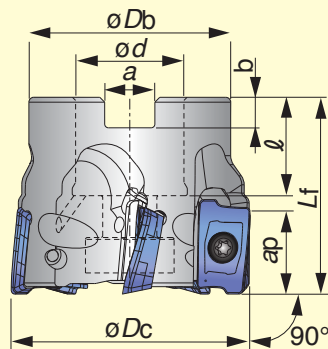
ISO	Workpiece materials	Brinell hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)		
						MJ	MS	AJ
<b>P</b>	Low carbon steel (S15C / C15E4 etc.)	~ 200	First choice	<b>AH725</b>	100 - 250	0.10 - 0.18	-	-
		~ 200	For wear resistance	<b>T3130</b>	100 - 250	0.10 - 0.18	-	-
	High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.)	200 ~ 300	First choice	<b>AH725</b>	100 - 200	0.08 - 0.14	-	-
		200 ~ 300	For wear resistance	<b>T3130</b>	100 - 200	0.08 - 0.14	-	-
	Tool steel (SKD11 / X153CrMoV12 etc.)	150 ~ 300	First choice	<b>AH725</b>	100 - 200	0.08 - 0.14	-	-
		150 ~ 300	For wear resistance	<b>T3130</b>	100 - 200	0.08 - 0.14	-	-
<b>M</b>	Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	-	<b>AH130</b>	100 - 150	-	0.08 - 0.15	-
<b>K</b>	Grey cast irons (FC250 / 250 etc.)	150 ~ 250	First choice	<b>AH120</b>	100 - 250	0.10 - 0.18	-	-
		150 ~ 250	For wear resistance	<b>T1115</b>	100 - 250	0.10 - 0.18	-	-
	Ductile cast irons (FCD450 / 450-10S etc.)	150 ~ 250	First choice	<b>AH120</b>	80 - 200	0.10 - 0.18	-	-
		150 ~ 250	For wear resistance	<b>T1115</b>	80 - 200	0.10 - 0.18	-	-
<b>N</b>	Aluminium alloys (Si < 13%)	-	-	<b>DS1100</b>	200 - 500	-	-	0.05 - 0.18
	Aluminium alloys (Si ≥ 13%)	-	-	<b>DS1100</b>	100 - 200	-	-	0.05 - 0.18
<b>S</b>	Titanium alloys (Ti-6Al-4V etc.)	-	-	<b>AH130</b>	20 - 60	-	0.08 - 0.14	-
	Superalloys (Inconel718 etc.)	-	-	<b>AH725</b>	20 - 40	0.06 - 0.12	-	-

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

## Cutter

### Bore type

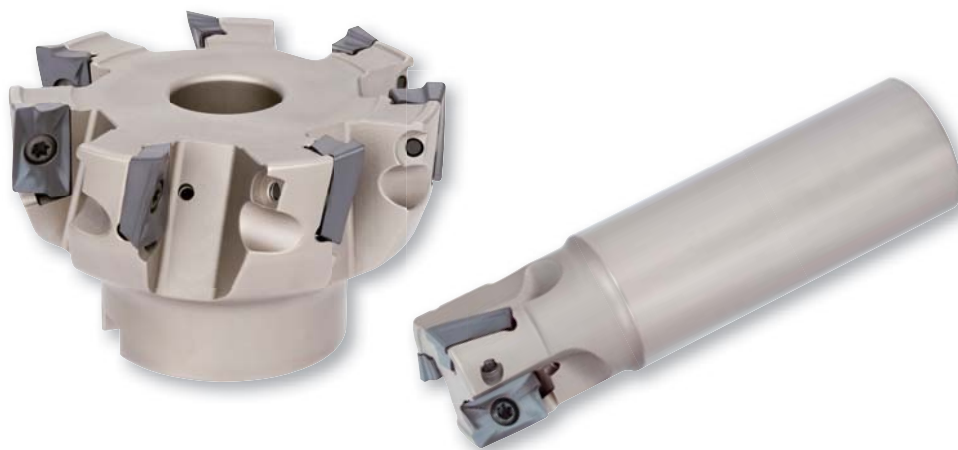


Max.  $ap = 16.7$  mm

#### Parts

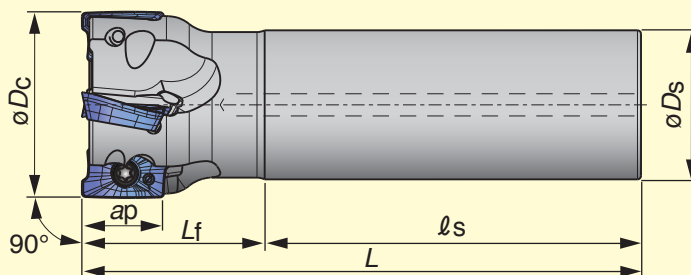
Description	Cat. No.	
Applicable cutter	TPO18R...	
Wrench	Torx bit	<b>BT15M</b>
	Grip	<b>H-TBS</b>
Mono block type wrench	-	

Cat. No.	Stock	No. of inserts	Dimensions (mm)							Weight (kg)	Air hole	Center bolt	Clamping screw	Inserts
			* $\phi D_c$	$\phi D_b$	$\phi d$	$\ell$	** $L_f$	$b$	$a$					
TPO18R040M16.0-04	●	4	40	35	16	18	40	5.6	8.2	0.2	with	FSHM8-30H	CSTB-4L093	AO□T1805...
TPO18R040M16.0E04	●	4	40	35	16	18	40	5.6	8.4	0.2	with	FSHM8-30H	CSTB-4L093	AO□T1805...
TPO18R050M22.0-05	●	5	50	41	22	20	40	6	10	0.2	with	CM10x30H	CSTB-4L093	AO□T1805...
TPO18R050M22.0E05	●	5	50	41	22	20	40	6.3	10.4	0.3	with	CM10x30H	CSTB-4L093	AO□T1805...
TPO18R063M22.0-06	●	6	63	41	22	20	40	6	10	0.4	with	CM10x30H	CSTB-4L093	AO□T1805...
TPO18R063M22.0E06	●	6	63	41	22	20	40	6.3	10.4	0.5	with	CM10x30H	CSTB-4L093	AO□T1805...
TPO18R080M25.4-07	●	7	80	46	25.4	26	50	6	9.5	0.8	with	CM12x30H	CSTB-4L120	AO□T1805...
TPO18R080M27.0E07	●	7	80	50	27	22	50	7	12.4	1.0	with	CM12x30H	CSTB-4L120	AO□T1805...
TPO18R100M31.7-08	●	8	100	60	31.75	32	50	8	12.7	1.2	with	TMBA-M16H	CSTB-4L120	AO□T1805...
TPO18R100M32.0E08	●	8	100	60	32	28.5	50	8	14.4	1.4	with	TMBA-M16H	CSTB-4L120	AO□T1805...
TPO18R125M38.1-09	●	9	125	80	38.1	38	63	10	15.9	2.8	with	TMBA-M20H	CSTB-4L120	AO□T1805...
TPO18R125M40.0E09	●	9	125	71	40	32	63	9	16.4	2.8	with	TMBA-M20H	CSTB-4L120	AO□T1805...
TPO18R160M40.0E10	●	10	160	100	40	29	63	9	16.4	4.9	without	-	CSTB-4L120	AO□T1805...
TPO18R160M50.8-10	●	10	160	100	50.8	46	63	11	19	4.9	without	-	CSTB-4L120	AO□T1805...



● : Stocked items

## Shank type



Max.  $a_p$  = 16.7 mm

### Parts

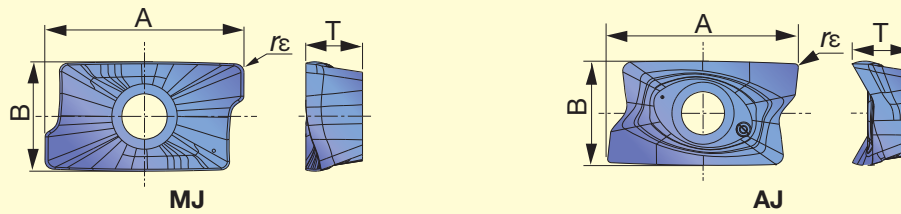
Description	Cat. No.	
Applicable cutter	EPO18R...	
Wrench	Torx bit	-
	Grip	-
Mono block type wrench	<b>T-15DB</b>	

Cat. No.	Stock	No. of inserts	Dimensions (mm)					Weight (kg)	Air hole	Clamping Screw	Inserts
			* $\phi D_c$	$\phi D_s$	$l_s$	$L_f$	$L$				
EPO18R025M25.0-02	●	2	25	25	80	35	115	0.4	with	CSTB-4L085	AO□T1805...
EPO18R025M25.0-02L	●	2	25	25	150	70	220	0.8	with	CSTB-4L085	AO□T1805...
EPO18R028M25.0-02	●	2	28	25	80	35	115	0.4	with	CSTB-4L085	AO□T1805...
EPO18R028M25.0-02L	●	2	28	25	150	70	220	0.8	with	CSTB-4L085	AO□T1805...
EPO18R030M32.0-02	●	2	30	32	80	40	120	0.6	with	CSTB-4L085	AO□T1805...
EPO18R030M32.0-02L	●	2	30	32	175	80	255	1.4	with	CSTB-4L085	AO□T1805...
EPO18R030M32.0-03	●	3	30	32	80	40	120	0.6	with	CSTB-4L085	AO□T1805...
EPO18R032M32.0-02	●	2	32	32	80	40	120	0.7	with	CSTB-4L093	AO□T1805...
EPO18R032M32.0-02L	●	2	32	32	175	80	255	1.5	with	CSTB-4L093	AO□T1805...
EPO18R032M32.0-03	●	3	32	32	80	40	120	0.6	with	CSTB-4L093	AO□T1805...
EPO18R035M32.0-02	●	2	35	32	80	40	120	0.7	with	CSTB-4L093	AO□T1805...
EPO18R035M32.0-02L	●	2	35	32	175	80	255	1.5	with	CSTB-4L093	AO□T1805...
EPO18R035M32.0-03	●	3	35	32	80	40	120	0.7	with	CSTB-4L093	AO□T1805...
EPO18R040M32.0-02L	●	2	40	32	205	50	255	1.6	with	CSTB-4L093	AO□T1805...
EPO18R040M32.0-03	●	3	40	32	80	40	120	0.7	with	CSTB-4L093	AO□T1805...
EPO18R040M32.0-04	●	4	40	32	80	40	120	0.7	with	CSTB-4L093	AO□T1805...
EPO18R040M42.0-02L	●	2	40	42	210	100	310	3.0	with	CSTB-4L093	AO□T1805...
EPO18R050M32.0-03	●	3	50	32	80	40	120	0.8	with	CSTB-4L093	AO□T1805...
EPO18R050M32.0-05	●	5	50	32	80	40	120	0.8	with	CSTB-4L093	AO□T1805...
EPO18R050M42.0-03L	●	3	50	42	310	50	360	3.8	with	CSTB-4L093	AO□T1805...
EPO18R063M32.0-04	●	4	63	32	80	45	125	1.0	with	CSTB-4L120	AO□T1805...
EPO18R063M32.0-06	●	6	63	32	80	45	125	1.1	with	CSTB-4L120	AO□T1805...
EPO18R063M42.0-03L	●	3	63	42	310	50	360	4.0	with	CSTB-4L120	AO□T1805...

\* The  $\phi D_c$  in the above table shows the diameter when MJ chipbreaker is used.  
When AJ chipbreaker is used, the diameter is equal to the above shown  $\phi D_c + 0.2$  mm.

● : Stocked items

## ● Inserts



Cat. No.	Accuracy	Honing	Grades			Dimensions (mm)			
			Coated		Carbide	A	B	T	r $\epsilon$
			AH725	AH140	KS15F				
AOMT180508PDPR-MJ	M	with	●	●		19.5	10.7	5.6	0.8
AOMT180516PDPR-MJ	M	with	●	●		19.5	10.7	5.6	1.6
AOMT180524PDPR-MJ	M	with	●	●		19.5	10.7	5.6	2.4
AOMT180532PDPR-MJ	M	with	●	●		19.5	10.7	5.6	3.2
AOGT180504PDFR-AJ	G	without			●	19.8	10.8	6.1	0.4
AOGT180508PDFR-AJ	G	without			●	19.8	10.8	6.1	0.8

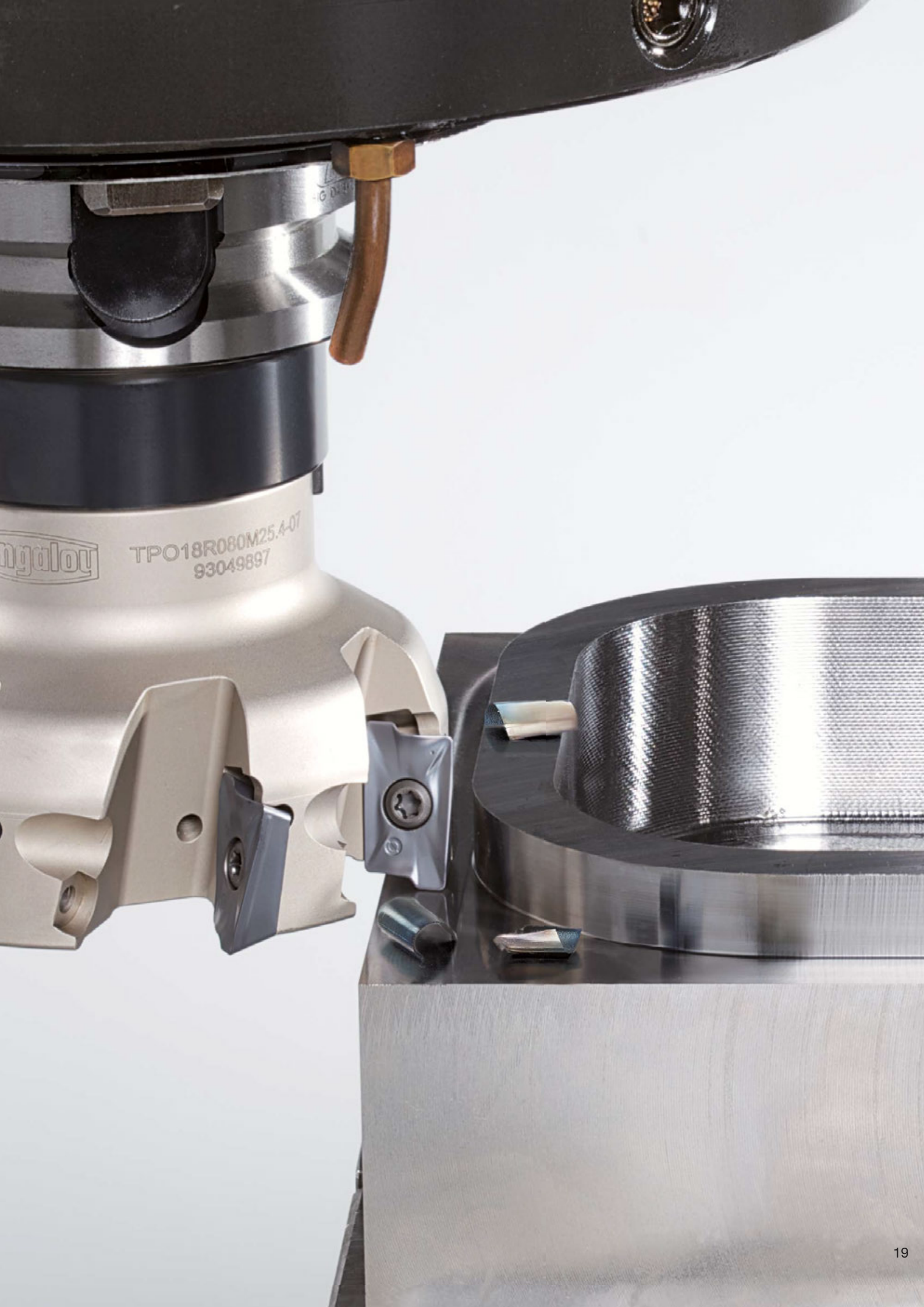
● : Stocked items

## ● Standard cutting conditions

ISO	Workpiece materials	Brinell hardness HB	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)	
					MJ	AJ
	Low carbon steel (S15C / C15E4 etc.)	~ 200	AH725	100 - 250	0.08 - 0.25	-
<b>P</b>	High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.)	200 ~ 300	AH725	100 - 230	0.08 - 0.2	-
	Tool steel (SKD11 / X153CrMoV12 etc.)	150 ~ 300	AH725	100 - 180	0.08 - 0.2	-
<b>M</b>	Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	AH140	90 - 200	0.08 - 0.2	-
<b>K</b>	Grey cast irons (FC250 / 250 etc.)	150 ~ 250	AH725	140 - 250	0.08 - 0.25	-
	Ductile cast irons (FCD450 / 450-10S etc.)	150 ~ 250	AH725	110 - 200	0.08 - 0.25	-
<b>N</b>	Aluminium alloys (Si < 13%)	-	KS15F	300 - 1000	-	0.05 - 0.25
	Aluminium alloys (Si ≥ 13%)	-	KS15F	100 - 200	-	0.05 - 0.25
<b>S</b>	Titanium alloys (Ti-6Al-4V etc.)	-	AH725	20 - 60	0.08 - 0.18	-
	Superalloys (Inconel718 etc.)	-	AH725	20 - 40	0.08 - 0.15	-

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

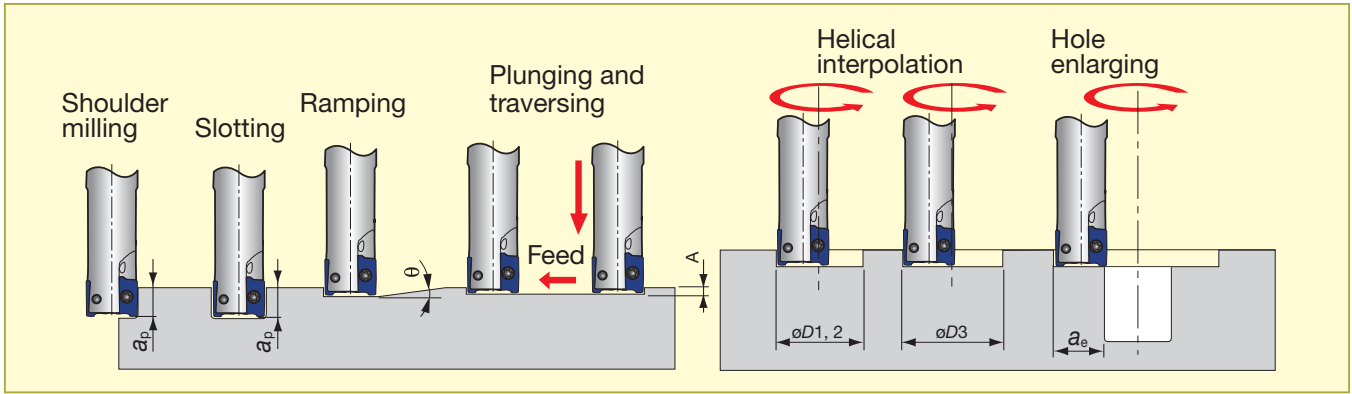
- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.



Ingaloy

TPO18R080M25.4-07  
93049897

● **Machining applications**



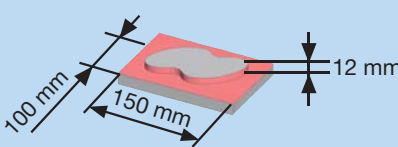
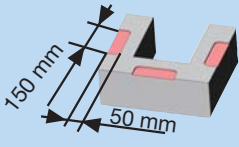
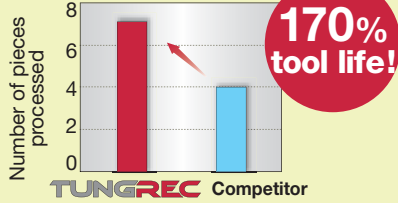
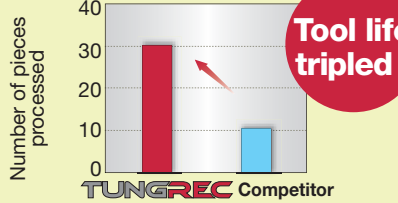
Cat. No.	Tool- $\phi$ $\phi D_c$ (mm)	Chip-breaker	Max. depth of cut $a_p$ (mm)	Max. ramping angle $\theta$	Max. plunging A (mm)	Min. machining $\phi D_1$ (mm)	Max. machining $\phi D_2$ (mm)	*Max. machining $\phi D_3$ (mm)	Max. cutting width in enlarging $a_e$ (mm)
E/HPO07R012...	$\phi 12$	MJ	7	8	0.5	16	23	20.5	11.5
E/HPO07R016...	$\phi 16$	MJ	7	5	0.5	24	3	28.5	15.5
EPO07R018...	$\phi 18$	MJ	7	4	0.5	28	35	32.5	17.5
E/HPO07R020...	$\phi 20$	MJ	7	3.5	0.5	32	39	36.5	19.5
EPO07R022...	$\phi 22$	MJ	7	3	0.5	36	43	40.5	21.5
E/HPO07R025...	$\phi 25$	MJ	7	2.5	0.5	42	49	46.5	24.5
EPO07R028...	$\phi 28$	MJ	7	2	0.5	48	55	52.5	27.5
TPO07R032...	$\phi 32$	MJ	7	1.8	0.5	56	63	60.5	31.5
TPO07R040	$\phi 40$	MJ	7	1.2	0.5	72	79	76.5	39.5
TPO07R050...	$\phi 50$	MJ	7	0.9	0.5	92	99	96.5	49.5
E/HPO07R012...	$\phi 12$	AJ	6.4	8	0.5	16	23	20.5	11.5
E/HPO07R016...	$\phi 16$	AJ	6.4	5	0.5	24	3	28.5	15.5
EPO07R018...	$\phi 18$	AJ	6.4	4	0.5	28	35	32.5	17.5
E/HPO07R020...	$\phi 20$	AJ	6.4	3.5	0.5	32	39	36.5	19.5
EPO07R022...	$\phi 22$	AJ	6.4	3	0.5	36	43	40.5	21.5
E/HPO07R025...	$\phi 25$	AJ	6.4	2.5	0.5	42	49	46.5	24.5
EPO07R028...	$\phi 28$	AJ	6.4	2	0.5	48	55	52.5	27.5
TPO07R032...	$\phi 32$	AJ	6.4	1.8	0.5	56	63	60.5	31.5
TPO07R040	$\phi 40$	AJ	6.4	1.2	0.5	72	79	76.5	39.5
TPO07R050...	$\phi 50$	AJ	6.4	0.9	0.5	92	99	96.5	49.5
E/HPO07R012...	$\phi 12.6$	HJ	0.8	5	0.5	17	24	-	9.6
E/HPO07R016...	$\phi 16.6$	HJ	0.8	3	0.5	25	32	-	13.6
EPO07R018...	$\phi 18.6$	HJ	0.8	2.5	0.5	29	36	-	15.6
E/HPO07R020...	$\phi 20.6$	HJ	0.8	2.1	0.5	33	40	-	17.6
EPO07R022...	$\phi 22.6$	HJ	0.8	1.9	0.5	37	44	-	19.6
E/HPO07R025...	$\phi 25.6$	HJ	0.8	1.6	0.5	43	50	-	22.6
EPO07R028...	$\phi 28.6$	HJ	0.8	1.3	0.5	49	56	-	25.6
TPO07R032...	$\phi 32.6$	HJ	0.8	1.1	0.5	57	64	-	29.6
TPO07R040	$\phi 40.6$	HJ	0.8	0.8	0.5	73	80	-	37.6
TPO07R050...	$\phi 50.6$	HJ	0.8	0.6	0.5	93	100	-	47.6
EPO11R012..., EPS11012R...	$\phi 12$	MJ, AJ	10.6	6	0.5	15	23	21	11.5
EPO11R016..., EPS11016R...	$\phi 16$	MJ, AJ	10.6	5	0.5	20	31	29	15.5
EPO11R018..., EPS11018R...	$\phi 18$	MJ, AJ	10.6	4	0.5	26	35	33	17.5
E/HPO11R020..., EPS11020R...	$\phi 20$	MJ, AJ	10.6	3	0.5	28	39	37	19.5
EPS11021R...	$\phi 21$	MJ, AJ	10.6	3	0.5	30	41	39	20.5
EPO11R022...	$\phi 22$	MJ, AJ	10.6	2.5	0.5	31	43	41	21.5

Cat. No.	Tool- $\varnothing$ $\varnothing D_c$ (mm)	Chip- breaker	Max. depth of cut $a_p$ (mm)	Max. ramping angle $\theta$	Max. plunging A (mm)	Min. machining $\varnothing D_1$ (mm)	Max. machining $\varnothing D_2$ (mm)	*Max. machining $\varnothing D_3$ (mm)	Max. cutting width in enlarging $a_e$ (mm)
E/PO11R025..., EPS11025R...	$\varnothing 25$	MJ, AJ	10.6	2	0.5	38	49	47	24.5
EPS11026R...	$\varnothing 26$	MJ, AJ	10.6	2	0.5	40	51	49	25.5
EPO11R028...	$\varnothing 28$	MJ, AJ	10.6	1.5	0.5	42	53	51	27.5
EPO11R030..., EPS11030R...	$\varnothing 30$	MJ, AJ	10.6	1.5	0.5	48	55	53	29.5
E/PO11R032..., EPS11032R...	$\varnothing 32$	MJ, AJ	10.6	1.5	0.5	52	59	57	31.5
EPS11033R...	$\varnothing 33$	MJ, AJ	10.6	1.5	0.5	54	65	63	32.5
EPO11R035...	$\varnothing 35$	MJ, AJ	10.6	1	0.5	56	67	65	34.5
E/TPO11R040..., E/TPS11040R...	$\varnothing 40$	MJ, AJ	10.6	1	0.5	68	79	77	39.5
TPO11R050..., E/TPS11050R...	$\varnothing 50$	MJ, AJ	10.6	0.7	0.5	68	99	97	49.5
TPO11R063..., TPS11063RB	$\varnothing 63$	MJ, AJ	10.6	0.5	0.5	114	125	123	62.5
TPO11R080..., TPS11080RB	$\varnothing 80$	MJ, AJ	10.6	0.4	0.5	148	159	157	79.5
TPO11R100..., TPS1100RB	$\varnothing 100$	MJ, AJ	10.6	0.3	0.5	188	199	197	99.5
EPO18R025...	$\varnothing 25$	MJ, AJ	16.7	6	1	32	48	44	24
EPO18R028...	$\varnothing 28$	MJ, AJ	16.7	4.5	1	38	54	50	27
EPO18R030...	$\varnothing 30$	MJ, AJ	16.7	4	1	42	58	54	29
EPO18R032...	$\varnothing 32$	MJ, AJ	16.7	3.5	1	46	62	58	31
EPO18R035...	$\varnothing 35$	MJ, AJ	16.7	3	1	52	68	64	34
E/TPO18R040...	$\varnothing 40$	MJ, AJ	16.7	2.5	1	62	78	74	39
E/TPO18R050...	$\varnothing 50$	MJ, AJ	16.7	1.9	1	82	98	94	49
E/TPO18R063	$\varnothing 63$	MJ, AJ	16.7	1.4	1	108	124	120	62
TPO18R080...	$\varnothing 80$	MJ, AJ	16.7	1	1	142	158	154	79
TPO18R100...	$\varnothing 100$	MJ, AJ	16.7	0.8	1	182	198	194	99
TPO18R125...	$\varnothing 125$	MJ, AJ	16.7	0.6	1	232	248	244	124
TPO18R160...	$\varnothing 160$	MJ, AJ	16.7	0.4	1	302	318	314	159

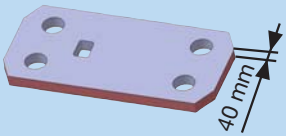
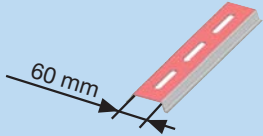
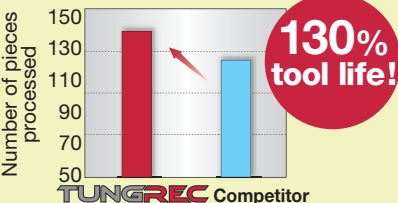
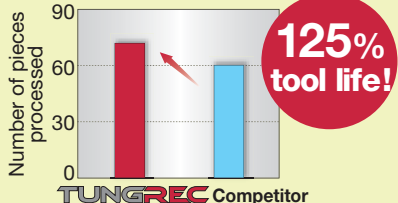
\*Flat bottom hole

Notes: Corner  $r_\epsilon$  for dimensions of  $\varnothing D_1$ ,  $\varnothing D_2$ , and  $\varnothing D_3$ :  $r_\epsilon = 0.4$  for EPO07 / EPS11 and  $r_\epsilon = 0.8$  for EPO18.

## Practical examples

Workpiece type		Machine parts	Compressor parts
Cutter		TPO07R040M16.0E10 (ø40, z = 10)	EPS11033RSB (ø33, z = 5)
Insert		AOMT070208PDPR-MJ	ASMT11T304PDPR-MJ
Grade		AH725	NS740
Workpiece material		SCM440 / 42CrMo4	SS400 / E275A
			
Cutting conditions	Cutting speed: $V_c$ (m/min)	130	150
	Feed per tooth: $f_z$ (mm/t)	0.1	0.13
	Feed speed: $V_f$ (mm/min)	1000	940
	Depth of cut: $a_p$ (mm)	3.0	5
	Width of cut: $a_e$ (mm)	~ 30	15
	Method of machining	Shoulder milling	Shoulder milling
	Coolant	Dry	Dry
	Machine	Vertical MC, BT40	Vertical MC, BT50
Results		 <p><b>170% tool life!</b></p> <p><math>V_f = 600 \rightarrow 1000</math> mm/min Improves productivity and makes tool life very stable.</p>	 <p><b>Tool life tripled!</b></p> <p>Improves tool life and surface finish.</p>

Workpiece type		Machine parts	Transportation rail
Cutter		TLS11R050M22.0E04	TPO18R050M22.0-05 (ø50, z = 5)
Insert		ASMT11T308PDPR-MJ	AOMT180516PDPR-MJ
Grade		AH725	AH725
Workpiece material		SS400 / E275A	S20C / C22
			
Cutting conditions	Cutting speed: $V_c$ (m/min)	150	220
	Feed per tooth: $f_z$ (mm/t)	0.17	0.16
	Feed speed: $V_f$ (mm/min)	649	1200
	Depth of cut: $a_p$ (mm)	40	6
	Width of cut: $a_e$ (mm)	5	20
	Method of machining	Shoulder milling	Face milling
	Coolant	Dry	Dry
	Machine	Vertical MC, BT50	Vertical MC, BT50
Results		 <p><b>130% tool life!</b></p> <p>Even in the machining of low rigid work piece, TungRec enables the productivity to improve 30% higher due to the low cutting force.</p>	 <p><b>125% tool life!</b></p> <p>Reduces machining noise with low cutting force.</p>





## Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi  
Iwaki-city, Fukushima, 970-1144 Japan  
Phone: +81-246-36-8501  
Fax: +81-246-36-8542  
www.tungaloy.co.jp

## Tungaloy America, Inc.

3726 N Ventura Drive  
Arlington Heights, IL 60004, U.S.A.  
Phone: +1-888-554-8394  
Fax: +1-888-554-8392  
www.tungaloyamerica.com

## Tungaloy Canada

432 Elgin St. Unit 3  
Brantford, Ontario N3S 7P7, Canada  
Phone: +1-519-758-5779  
Fax: +1-519-758-5791  
www.tungaloy.co.jp/ca

## Tungaloy de Mexico S.A.

C Los Arellano 113,  
Parque Industrial Siglo XXI  
Aguascalientes, AGS, Mexico 20290  
Phone: +52-449-929-5410  
Fax: +52-449-929-5411  
www.tungaloy.co.jp/mx

## Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora  
13280-000 Vinhedo, São Paulo, Brasil  
Phone: +55-19-38262757  
Fax: +55-19-38262757  
www.tungaloy.com.br

## Tungaloy Germany GmbH

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.de

## Tungaloy France S.A.S.

ZA Courtaboeuf - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboeuf Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.fr

## Tungaloy Italia S.r.l.

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.it

## Tungaloy Czech s.r.o.

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
www.tungaloy.cz

## Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7  
Pol. Ind. Bufalvent  
ES-08243 Manresa (BCN), Spain  
Phone: +34 93 113 1360  
Fax: +34 93 876 2798  
www.tungaloy.es

## Tungaloy Scandinavia AB

Bultgatan 38  
442 40 Kungälv, Sweden  
Phone: +46-462119200  
www.tungaloy.se

## Tungaloy Rus, LLC

115432, Russian Federation, Moscow,  
Andropova avenue., h.18, bld.7, flt. 11,  
office 3.  
Phone: +7-499-683-01-80/81  
www.tungaloy.co.jp/ru

## Tungaloy East LLC

620075, Russian Federation, Sverdlovsk  
Region, Ekaterinburg, Mamina-Sibiryaka str.,  
bldg. 101, room 202  
Phone: +7-343-286-48-23/24  
Fax: +7-912-284-91-69  
www.tungaloy.co.jp/ru

## Tungaloy Polska Sp. z o.o.

ul. Genewska 24  
03-963 Warszawa, Poland  
Phone: +48-22-617-0890  
Fax: +48-22-617-0890  
www.tungaloy.co.jp/pl

## Tungaloy U.K. Ltd

The Technology Centre,  
Wolverhampton Science Park  
Glaisher Drive, Wolverhampton  
West Midlands WV10 9RU, UK  
Phone: +44 121 4000 231  
Fax: +44 121 270 9694  
www.tungaloy.co.jp/uk  
salesinfo@tungaloyuk.co.uk

## Tungaloy Hungary Kft

Erzsébet királyné útja 125  
H-1142 Budapest, Hungary  
Phone: +36 1 781-6846  
Fax: +36 1 781-6866  
www.tungaloy.co.jp/hu  
info@tungaloytools.hu

## Tungaloy Turkey

Dudullu, OSB 4. Cad No:4  
34776 Umraniye Istanbul, TURKEY  
Phone: +90 216 540 04 67  
Fax: +90 216 540 04 87  
www.tungaloy.com.tr  
info@tungaloy.com.tr

## Tungaloy Benelux b.v.

Tjalk 70  
NL-2411 NZ Bodegraven, Netherlands  
Phone: +31 172 630 420  
Fax: +31 172 630 429  
www.tungaloy-benelux.com

## Tungaloy Croatia

Josipa Kozarca 4  
10432 Bregana, Croatia  
Phone: +385 1 3326 604  
Fax: +385 1 3327 683  
www.tungaloy.hr

## Tungaloy Cutting Tool (Shanghai) Co., Ltd.

Rm No 401 No.88 Zhabei  
Jiangchang No.3 Rd  
Shanghai 200436, China  
Phone: +86-21-3632-1880  
Fax: +86-21-3621-1918  
www.tungaloy.co.jp/tots

## Tungaloy Cutting Tool (Thailand) Co., Ltd.

Interlink tower 4th Fl.  
1858/5-7 Bangna-Trad Road  
km.5 Bangna, Bangna, Bangkok 10260  
Thailand  
Phone: +66-2-751-5711  
Fax: +66-2-751-5715  
www.tungaloy.co.th

## Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.co.jp/tspl

## Tungaloy Vietnam

LE 04-38, Lexington Residence  
67 Mai Chi Tho, Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-8-37406660  
Fax: +84-8-37406662  
www.tungaloy.co.jp/tspl

## Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai -400013, India  
Phone: +91-22-6124-8804  
Fax: +91-22-6124-8899  
www.tungaloy.co.jp/in

## Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha  
Beotkkot-ro 244, Geumcheon-gu  
153-788 Seoul, Korea  
Phone: +82-2-2621-6161  
Fax: +82-2-6393-8952  
www.tungaloy.co.jp/kr

## Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14  
Kelana Jaya, 47301  
Petaling Jaya, Selangor Darul Ehsan  
Malaysia  
Phone: +603-7805-3222  
Fax: +603-7804-8563  
www.tungaloy.co.jp/my

## Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,  
Victoria 3178, Australia  
Phone: +61-3-9755-8147  
Fax: +61-3-9755-6070  
www.tungaloy.com.au

## PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.co.jp/id



www.tungaloy.com

follow us at:  
facebook.com/tungaloyjapan  
twitter.com/tungaloyjapan

To see this product in action visit:

# Tung-TV

www.youtube.com/tungaloycorporation

Distributed by:



DOWNLOAD  
Dr. Carbide App



FIND US ON THE CLOUD!  
machiningcloud.com



Available on the  
App Store



GET IT ON  
Google play



AS9100 Certified  
78006  
2015.11.04  
ISO14001 Certified  
EC97J1123  
1997.11.26





MillLine

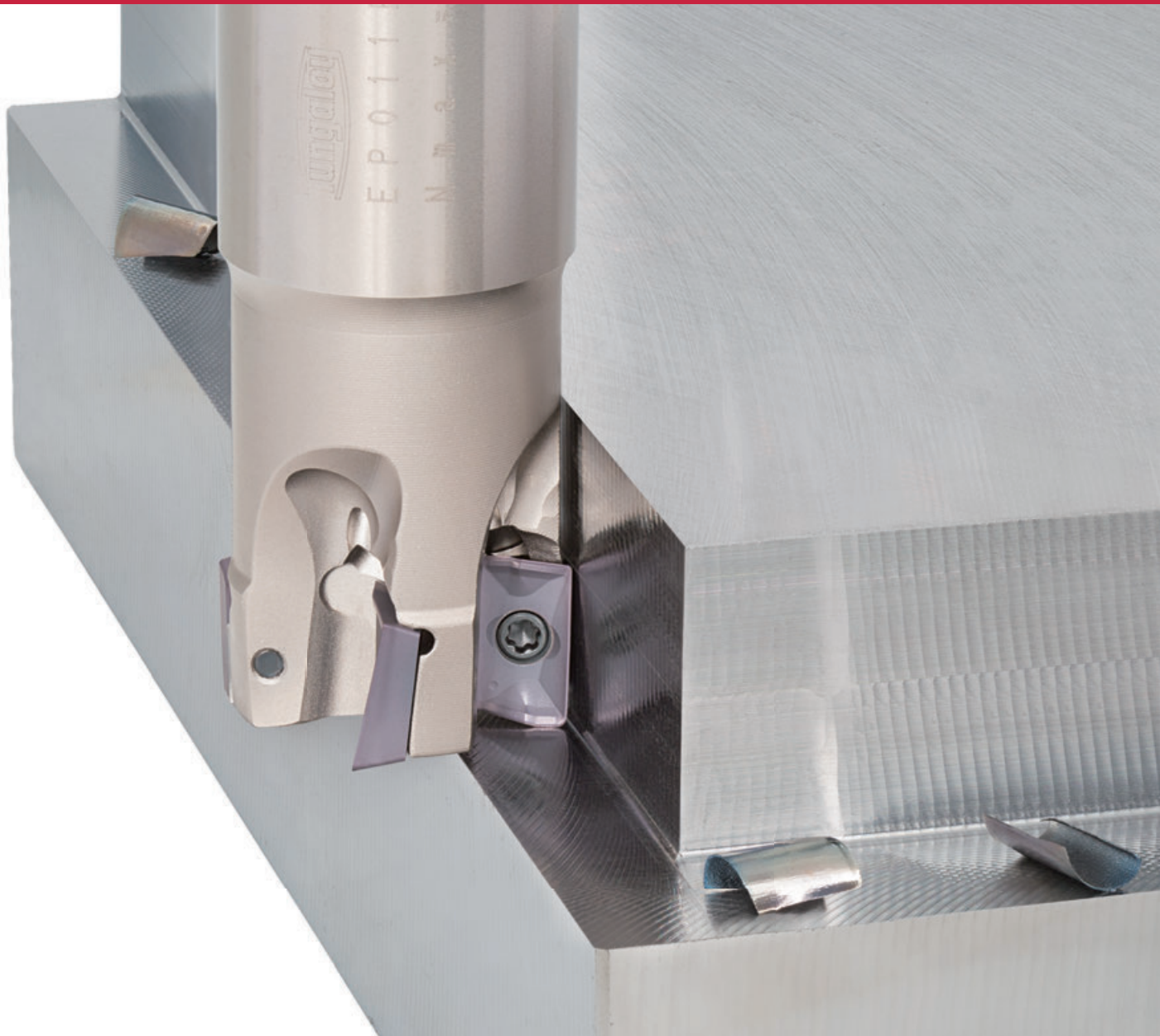
**TUNGREC**

www.tungaloy.com

Tungaloy Report No. 380S1-G



**New grades lineup** for a wide range of materials



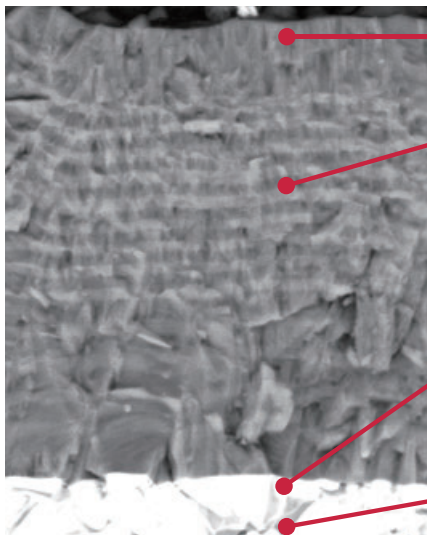
**INDUSTRY 4.0**  
*FEED the SPEED!*



# Grades with long tool life for a wide range of materials

**New AH3225** **P M**  
**PREMIUMTEC**

- Nano multi-layer coating technology with three major properties for optimal cutting edge integrity
- Increased resistance to wear, fracture, oxidation, built-up edge, and delamination



### Technology 1 - Resistance to built-up edge

The coating surface prevents built-up edge

### Technology 2 - Resistance to wear, oxidation, and fracture

Multi-layered coating is designed to resist wear and oxidation, while preventing micro-cracks from propagating in the coating layer for improved resistance to edge chipping

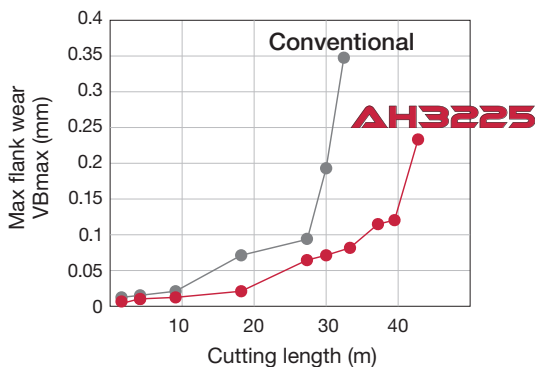
### Technology 3 - Strong coating/substrate adhesion

Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

### Carbide substrate

High resistance to fracture

## Tool life comparison of AH3225



<b>P</b>	Cutter	: EPO11R025M25.0-04 (ø25 mm, z = 4)
	Insert	: ASMT11T308PDPR-MJ AH3225
	Workpiece material	: S55C
	Cutting speed	: Vc = 200 m/min
	Feed per tooth	: fz = 0.1 mm/t
	Depth of cut	: ap = 3 mm
	Cutting width	: ae = 20 mm
	Coolant	: Dry
	Machine	: Vertical M/C, HSK63

## Updated grade selection lineup

It possible to select the optimal grade for each workpiece material.

ISO	Workpiece materials	First choice	Fracture resistance	Wear resistance	Surface quality
<b>P</b>	Steel	<b>New</b> <b>AH3225</b>		<b>New</b> <b>T3225</b>	<b>N5740</b>
<b>M</b>	Stainless	<b>New</b> <b>AH3225</b>		<b>AH130</b>	
<b>K</b>	Grey cast irons	<b>AH120</b>		<b>New</b> <b>T1215</b>	
	Ductile cast irons	<b>AH120</b>	<b>New</b> <b>AH3225</b>	<b>New</b> <b>T1215</b>	
<b>N</b>	Non-ferrous	<b>DS1100</b> <b>KS05F</b>			
<b>S</b>	Titanium alloys	<b>AH130</b>	<b>New</b> <b>AH3225</b>		
	Heat resisting alloys	<b>AH725</b>			
<b>H</b>	Hard materials	<b>AH725</b>			

**AH3225**  
PREMIUMTEC



- PVD grade for high fracture resistance
- Most suitable for steel and stainless steel in general cutting parameters

**New**  
**T3225**  
PREMIUMTEC



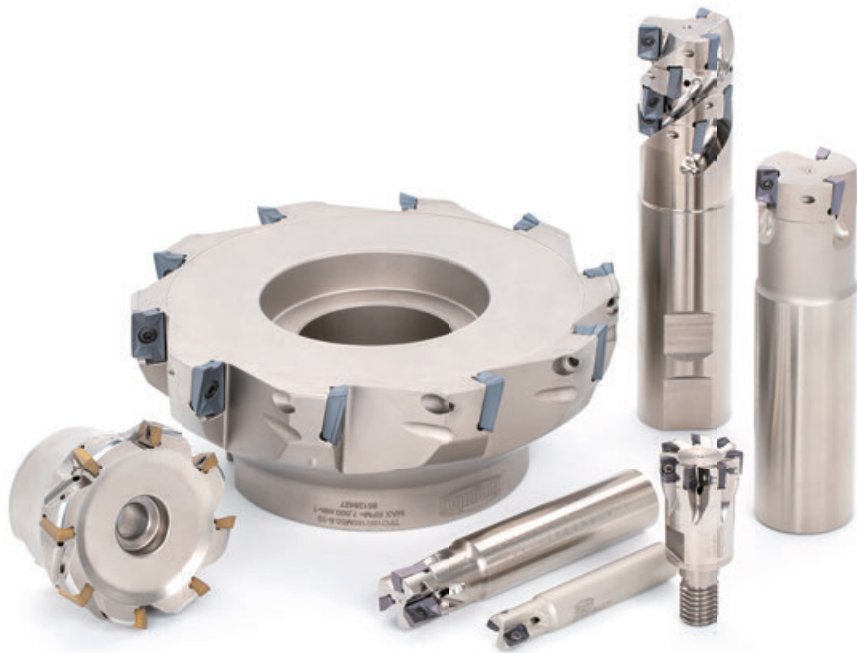
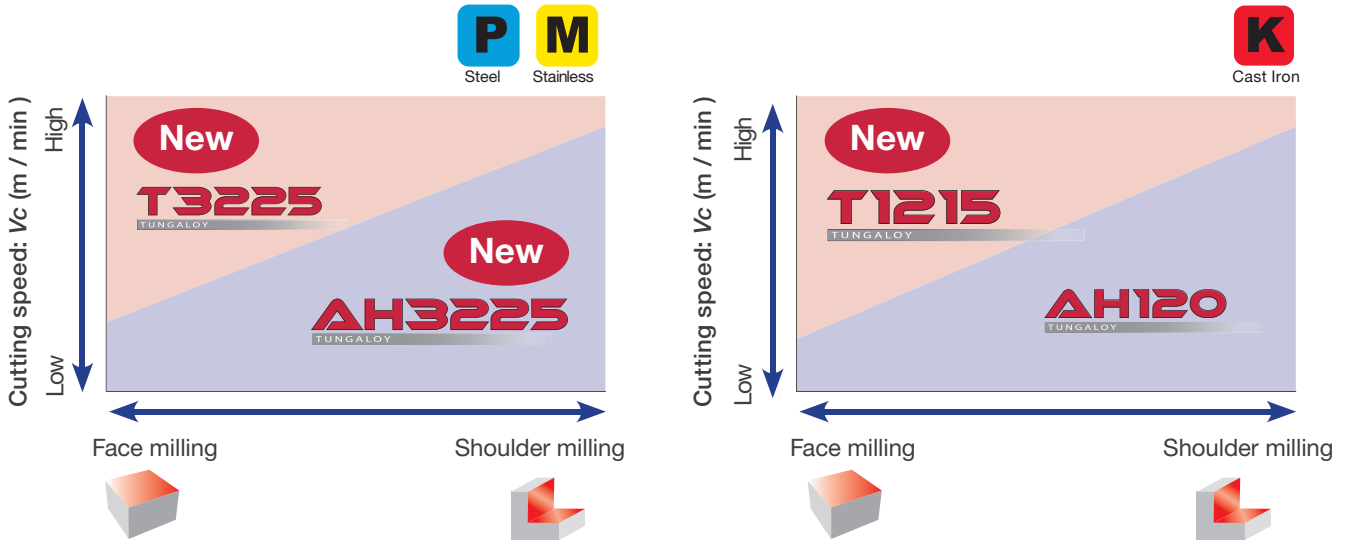
- CVD grade with superior resistance to chipping and fracture
- Ideal for high speed machining of steel and stainless steel

**New**  
**T1215**  
PREMIUMTEC



- CVD grade with superior resistance to wear and chipping
- Ideal for high speed machining of cast iron

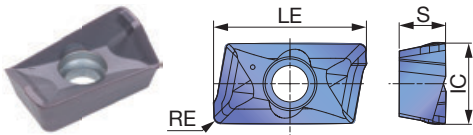
## Application area



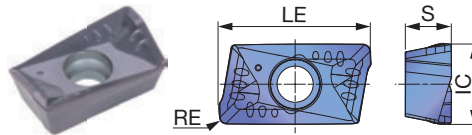


## INSERT

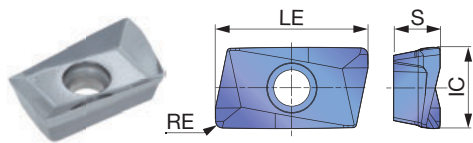
### ASMT11-MJ



### ASMT11-MS



### ASGT11-AJ



<b>P</b> Steel	☆			☆	★	☆			★				
<b>M</b> Stainless		☆	☆	☆	★	☆							
<b>K</b> Cast iron	★			☆	☆	☆							
<b>N</b> Non-ferrous								★					
<b>S</b> Superalloys		★		★	☆								
<b>H</b> Hard materials				★									

★ : First choice  
☆ : Second choice

Designation	RE	APMX	Coated							Cermet	Uncoated	LE	IC	S			
			AH120	AH130	AH140	AH725	AH3225	T3225	T1215	DS1100	NS740				KS05F		
ASMT11T304PDPR-MJ	0.4	10.6	●	●	●	●	●	●	●	●					12.3	6.7	3.7
ASMT11T308PDPR-MJ	0.8	10.6	●	●	●	●	●	●	●	●					12.3	6.7	3.7
ASMT11T312PDPR-MJ	1.2	10.6	●	●	●	●	●	●	●	●					12.3	6.7	3.7
ASMT11T316PDPR-MJ	1.6	10.6	●	●	●	●	●	●	●	●					12.3	6.7	3.7
ASMT11T320PDPR-MJ	2	10.6	●				●	●							12.3	6.7	3.7
ASMT11T330PDPR-MJ	3	10.6	●	●			●	●							12.3	6.7	3.7
ASMT11T304PDPR-MS	0.4	10.6		●	●		●								12.3	6.7	3.7
ASGT11T304PDPR-AJ	0.4	10.6								●		●			12.3	6.7	3.7
ASGT11T308PDPR-AJ	0.8	10.6								●		●			12.3	6.7	3.7

Caution : The contour radius when using the tool is smaller than the RE value.  
If RE is 1.2 mm or more, it will be about 10% smaller than RE.

● : New  
● : Line up

## STANDARD CUTTING CONDITIONS

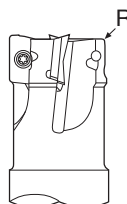
TPO11 / EPO11 / HPO11 type

ISO	Workpiece material	Hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)		
						MJ	MS	AJ
P	Low carbon steel S15C, etc. C15E4, etc.	< 200	First choice	AH3225	100 - 250	0.1 - 0.2	-	-
		< 200	For wear resistance	T3225	100 - 250	0.1 - 0.2	-	-
		< 200	Surface quality	NS740	100 - 250	0.05 - 0.15	-	-
	High carbon steel, Alloy steel S45C, SCM440, etc. C45, 42CrMo4, etc.	200 - 300	First choice	AH3225	100 - 200	0.1 - 0.15	-	-
		200 - 300	For wear resistance	T3225	100 - 200	0.1 - 0.15	-	-
		200 - 300	Surface quality	NS740	100 - 200	0.05 - 0.12	-	-
Tool steel SKD61, etc. X40CrMoV5-1, etc.	150 - 300	First choice	AH3225	100 - 150	0.1 - 0.15	-	-	
	150 - 300	For wear resistance	T3225	100 - 150	0.1 - 0.15	-	-	
M	Stainless steel SUS304, etc. X5CrNi18-9, etc.	-	First choice	AH3225	80 - 200	-	0.08 - 0.2	-
		-	For wear resistance	AH130	80 - 200	-	0.08 - 0.2	-
K	Grey cast irons FC250, etc. 250, etc.	150 - 250	First choice	AH120	100 - 250	0.12 - 0.2	-	-
		150 - 250	For wear resistance	T1215	100 - 250	0.12 - 0.2	-	-
	Ductile cast irons FCD450, etc. 400-15S, etc.	150 - 250	First choice	AH120	80 - 200	0.12 - 0.2	-	-
		150 - 250	For wear resistance	T1215	80 - 200	0.12 - 0.2	-	-
N	Aluminium alloys Si < 13%	-	First choice	DS1100	300 - 1000	-	-	0.05 - 0.2
	Aluminium alloys Si ≥ 13%	-	First choice	DS1100	100 - 200	-	-	0.05 - 0.2
	Copper alloys	-	First choice	KS05F	200 - 500	-	-	0.05 - 0.2
S	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH130	20 - 60	0.08 - 0.13	-	-
		-	For fracture resistance	AH3225	20 - 60	0.08 - 0.13	-	-
	Superalloys Inconel718, etc.	-	First choice	AH725	20 - 40	0.08 - 0.13	-	-
		-	For fracture resistance	AH130	20 - 40	0.08 - 0.13	-	-
		-	For wear resistance	AH120	20 - 40	0.08 - 0.13	-	-
H	Hardened steel SKD61, etc. X40CrMoV5-1, etc. SKD11, etc. X153CrMoV12, etc.	40 - 50 HRC	First choice	AH725	45 - 70	0.04 - 0.08	-	-
		50 - 60 HRC	First choice	AH725	40 - 65	0.04 - 0.06	-	-

### CAUTIONARY POINT IN MODIFYING CUTTER BODIES

When using inserts with corner radius RE ≥ 2 mm, standard cutter bodies have to be modified "R". (Only for TPO11, EPO11, TLS11, ELS11, HPO11)

About roughing type TLS11, ELS11  
From 2nd row onwards, please use insert with RE = 0.4 or 0.8 mm



Corner radius RE (mm)	The dimension of modifying (mm)
0.4 - 1.6	Unnecessary
2 - 3.2	2

## Roughing type TLS11 / ELS11

ISO	Workpiece material	Hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)		
						MJ	MS	AJ
P	Low carbon steel S15C, etc. C15E4, etc.	< 200	First choice	AH3225	100 - 250	0.10 - 0.18	-	-
		< 200	For wear resistance	T3225	100 - 250	0.10 - 0.18	-	-
	High carbon steel, Alloy steel S45C, SCM440, etc. C45, 42CrMo4, etc.	200 - 300	First choice	AH3225	100 - 200	0.08 - 0.14	-	-
		200 - 300	For wear resistance	T3225	100 - 200	0.08 - 0.14	-	-
	Tool steel SKD61, etc. X40CrMoV5-1, etc.	150 - 300	First choice	AH3225	100 - 200	0.08 - 0.14	-	-
		150 - 300	For wear resistance	T3225	100 - 200	0.08 - 0.14	-	-
M	Stainless steel SUS304, etc. X5CrNi18-9, etc.	-	First choice	AH3225	100 - 150	-	0.08 - 0.15	-
		-	For wear resistance	AH130	100 - 150	-	0.08 - 0.15	-
K	Grey cast irons FC250, etc. 250, etc.	150 - 250	First choice	AH120	100 - 250	0.10 - 0.18	-	-
		150 - 250	For wear resistance	T1215	100 - 250	0.10 - 0.18	-	-
	Ductile cast irons FCD450, etc. 400-15S, etc.	150 - 250	First choice	AH120	80 - 200	0.10 - 0.18	-	-
		150 - 250	For wear resistance	T1215	80 - 200	0.10 - 0.18	-	-
N	Aluminium alloys Si < 13%	-	First choice	DS1100	200 - 500	-	-	0.05 - 0.18
	Aluminium alloys Si ≥ 13%	-	First choice	DS1100	100 - 200	-	-	0.05 - 0.18
S	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH130	20 - 60	-	0.08 - 0.14	-
		-	For fracture resistance	AH3225	20 - 60	-	0.08 - 0.14	-
	Superalloys Inconel718, etc.	-	First choice	AH725	20 - 40	0.06 - 0.12	-	-
		-	For wear resistance	AH130	20 - 40	0.06 - 0.12	-	-
		-	For wear resistance	AH3225	20 - 40	0.06 - 0.12	-	-
		-	For wear resistance	AH3225	20 - 40	0.06 - 0.12	-	-

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

## Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi  
Iwaki-city, Fukushima, 970-1144 Japan  
Phone: +81-246-36-8501  
Fax: +81-246-36-8542  
www.tungaloy.co.jp

## Tungaloy America, Inc.

3726 N Ventura Drive  
Arlington Heights, IL 60004, U.S.A.  
Phone: +1-888-554-8394  
Fax: +1-888-554-8392  
www.tungaloyamerica.com

## Tungaloy Canada

432 Elgin St. Unit 3  
Brantford, Ontario N3S 7P7, Canada  
Phone: +1-519-758-5779  
Fax: +1-519-758-5791  
www.tungaloy.co.jp/ca

## Tungaloy de Mexico S.A.

C Los Arellano 113,  
Parque Industrial Siglo XXI  
Aguascalientes, AGS, Mexico 20290  
Phone: +52-449-929-5410  
Fax: +52-449-929-5411  
www.tungaloy.co.jp/mx

## Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora  
13280-000 Vinhedo, São Paulo, Brasil  
Phone: +55-19-38262757  
Fax: +55-19-38262757  
www.tungaloy.com.br

## Tungaloy Germany GmbH

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.de

## Tungaloy France S.A.S.

ZA Courtaboef - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboef Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.fr

## Tungaloy Italia S.r.l.

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.it

## Tungaloy Czech s.r.o.

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
www.tungaloy.cz

## Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7  
Pol. Ind. Bufalvent  
ES-08243 Manresa (BCN), Spain  
Phone: +34 93 113 1360  
Fax: +34 93 876 2798  
www.tungaloy.es

## Tungaloy Scandinavia AB

Bultgatan 38  
442 40 Kungälv, Sweden  
Phone: +46-462119200  
www.tungaloy.se

## Tungaloy Rus, LLC

115432, Russian Federation, Moscow,  
Andropova avenue., h.18, bld.7, flt. 11,  
office 3.  
Phone: +7-499-683-01-80/81  
www.tungaloy.co.jp/ru

## Tungaloy East LLC

620075, Russian Federation, Sverdlovsk  
Region, Ekaterinburg, Mamina-Sibiryaka str.,  
bldg. 101, room 202  
Phone: +7-343-286-48-23/24  
Fax: +7-912-284-91-69  
www.tungaloy.co.jp/ru

## Tungaloy Polska Sp. z o.o.

ul. Genewska 24  
03-963 Warszawa, Poland  
Phone: +48-22-617-0890  
Fax: +48-22-617-0890  
www.tungaloy.co.jp/pl

## Tungaloy U.K. Ltd

The Technology Centre,  
Wolverhampton Science Park  
Glaisher Drive, Wolverhampton  
West Midlands WV10 9RU, UK  
Phone: +44 121 4000 231  
Fax: +44 121 270 9694  
www.tungaloy.co.jp/uk  
salesinfo@tungaloyuk.co.uk

## Tungaloy Hungary Kft

Erzsébet királyné útja 125  
H-1142 Budapest, Hungary  
Phone: +36 1 781-6846  
Fax: +36 1 781-6866  
www.tungaloy.co.jp/hu  
info@tungaloytools.hu

## Tungaloy Turkey

Dudullu, OSB 4. Cad No:4  
34776 Umraniye Istanbul, TURKEY  
Phone: +90 216 540 04 67  
Fax: +90 216 540 04 87  
www.tungaloy.com.tr  
info@tungaloy.com.tr

## Tungaloy Benelux b.v.

Tjalk 70  
NL-2411 NZ Bodegraven, Netherlands  
Phone: +31 172 630 420  
Fax: +31 172 630 429  
www.tungaloy-benelux.com

## Tungaloy Croatia

Josipa Kozarca 4  
10432 Bregana, Croatia  
Phone: +385 1 3326 604  
Fax: +385 1 3327 683  
www.tungaloy.hr

## Tungaloy Cutting Tool (Shanghai) Co., Ltd.

Rm No 401 No.88 Zhabei  
Jiangchang No.3 Rd  
Shanghai 200436, China  
Phone: +86-21-3632-1880  
Fax: +86-21-3621-1918  
www.tungaloy.co.jp/tots

## Tungaloy Cutting Tool (Thailand) Co., Ltd.

Interlink tower 4th Fl.  
1858/5-7 Bangna-Trad Road  
km.5 Bangna, Bangna, Bangkok 10260  
Thailand  
Phone: +66-2-751-5711  
Fax: +66-2-751-5715  
www.tungaloy.co.th

## Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.co.jp/tspl

## Tungaloy Vietnam

LE 04-38, Lexington Residence  
67 Mai Chi Tho, Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-8-37406660  
Fax: +84-8-37406662  
www.tungaloy.co.jp/tspl

## Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai -400013, India  
Phone: +91-22-6124-8804  
Fax: +91-22-6124-8899  
www.tungaloy.co.jp/in

## Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha  
Beotkkot-ro 244, Geumcheon-gu  
153-788 Seoul, Korea  
Phone: +82-2-2621-6161  
Fax: +82-2-6393-8952  
www.tungaloy.co.jp/kr

## Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14  
Kelana Jaya, 47301  
Petaling Jaya, Selangor Darul Ehsan  
Malaysia  
Phone: +603-7805-3222  
Fax: +603-7804-8563  
www.tungaloy.co.jp/my

## Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,  
Victoria 3178, Australia  
Phone: +61-3-9755-8147  
Fax: +61-3-9755-6070  
www.tungaloy.com.au

## PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.co.jp/id



www.tungaloy.com

follow us at:

facebook.com/tungaloyjapan

twitter.com/tungaloyjapan

To see this product in action visit:

# Tung-TV

www.youtube.com/tungaloycorporation

Distributed by:



DOWNLOAD  
Dr. Carbide App



FIND US ON THE CLOUD!  
machiningcloud.com



Available on the  
App Store



GET IT ON  
Google play



AS9100 Certified  
78006  
2015.11.04  
ISO14001 Certified  
EC97J1123  
1997.11.26



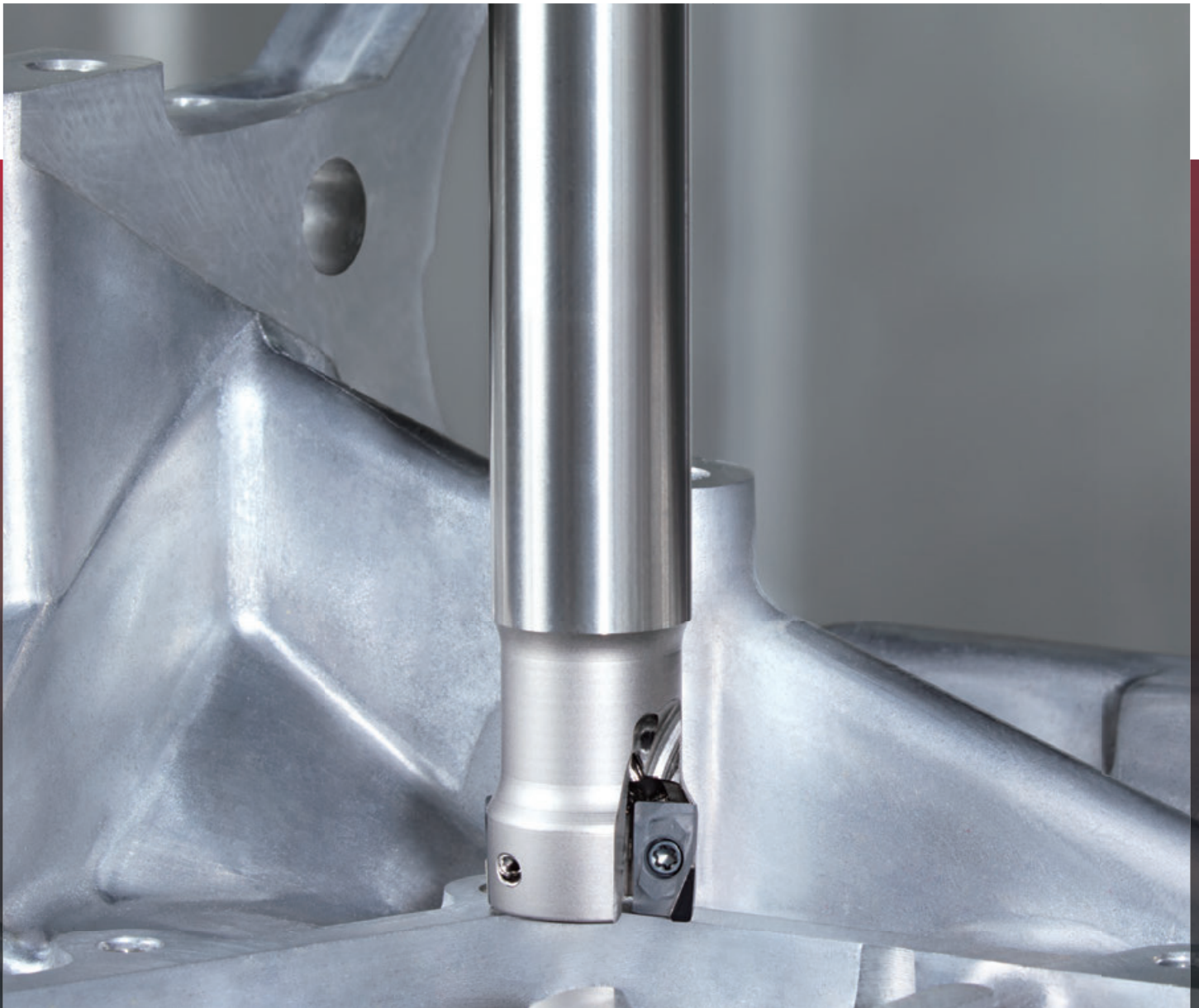


Shoulder milling tool

**TUNGREC**

Tungaloy Report No. 380S2-G

**Now available in DX110 PCD grade  
for long tool life and high precision  
aluminum machining**

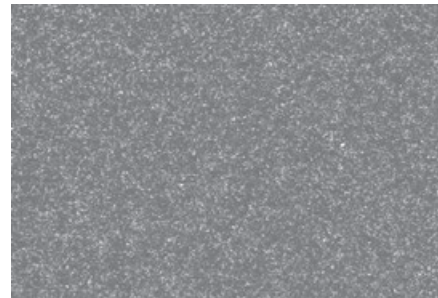




## PCD grade for finish machining of ISO N materials

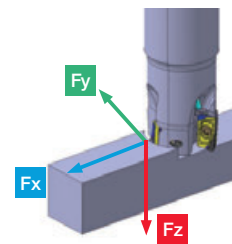
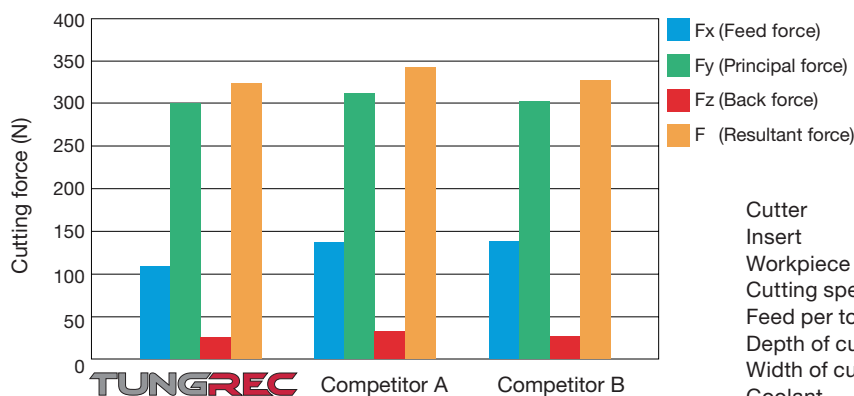
### DX110

- Polycrystalline diamond (PCD) grade with ultrafine grain microstructure provides superior surface finishing quality
- Excellent cutting edge integrity that maintains sharpness over long period of time



Microstructure image of DX110

### Cutting forces

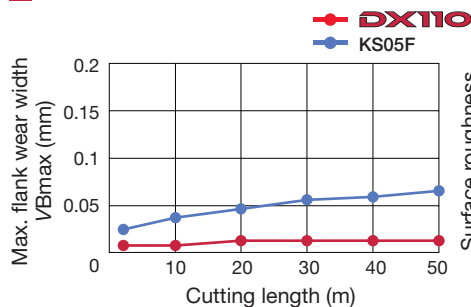


Cutter : EPO11R025M25.0-03 (ø25 mm, z = 3)  
 Insert : ASGW11T304PDFR-D DX110 (PCD)  
 Workpiece material : ADC12  
 Cutting speed : V<sub>c</sub> = 1,000 m/min  
 Feed per tooth : f<sub>z</sub> = 0.1 mm/t  
 Depth of cut : a<sub>p</sub> = 4 mm  
 Width of cut : a<sub>e</sub> = 15 mm  
 Coolant : Wet  
 Machine : Vertical M/C, BT40

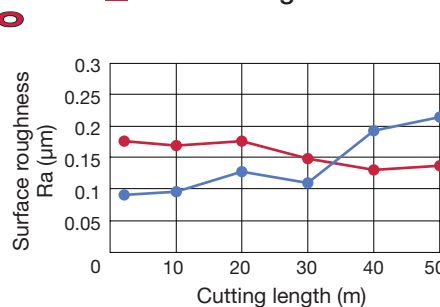
TungRec PCD inserts provide lower cutting forces during machining compared with competitors' PCD tools, making it suitable for long tool overhang applications where chatter is likely to occur.

### Surface quality

#### Wear resistance



#### Surface roughness



Cutter : EPO11R025M25.0-03 (ø25 mm, z = 3)  
 Insert : ASGW11T304PDFR-D DX110 (PCD)  
 ASGT11T304PDFR-AJ KS05F (Uncoated carbide)  
 Workpiece material : ADC12  
 Cutting speed : V<sub>c</sub> = 1,000 m/min  
 Feed per tooth : f<sub>z</sub> = 0.1 mm/t  
 Depth of cut : a<sub>p</sub> = 1 mm  
 Width of cut : a<sub>e</sub> = 15 mm  
 Coolant : Wet  
 Machine : Vertical M/C, BT40

PCD grade provides better wear resistance than carbide grade, enabling good surface quality over long period of time.





## Cautions when using at high RPM

1. Maximum RPMs designated for cutter diameters (DC) are shown in the table on the right. Do not use the cutter at a speed exceeding the designated maximum RPM. The cutter and inserts may be damaged by strong centrifugal force, causing property damages and possible personal injury or death.
2. When using at 10,000 min<sup>-1</sup> or higher, make sure to dynamically balance the cutter coupled with the arbor according to the balancing quality grades on the right.

DC (mm)	Max. number of revolutions Max. $n$ (min <sup>-1</sup> )
ø12	28,000
ø16	43,000
ø18	41,000
ø20	39,000
ø22	37,000
ø25	35,000
ø28	33,000
ø30	31,000
ø32	30,000
ø35	29,000
ø40	27,000
ø50	24,000
ø63	22,000
ø80	19,000
ø100	17,000

Number of revolutions $n$ (min <sup>-1</sup> )	Balancing quality grade G
- 20,000	G16
- 30,000	G6.3
30,000 -	G2.5



[www.tungaloy.com](http://www.tungaloy.com)  
 follow us at:  
[facebook.com/tungaloyjapan](https://facebook.com/tungaloyjapan)  
[twitter.com/tungaloyjapan](https://twitter.com/tungaloyjapan)  
[www.youtube.com/tungaloycorporation](https://www.youtube.com/tungaloycorporation)



AS9100 Certified  
 78006  
 2015.11.04  
 ISO 14001 Certified  
 EC97J1123  
 1997.11.26

Distributed by:



FIND US ON THE CLOUD!  
[machingcloud.com](http://machingcloud.com)

